

The Milbank Memorial Fund
QUARTERLY

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IN THIS ISSUE

SURGICAL treatment of wounds and fractures is as old as civilization. However, not until after the development of aseptic procedures and the successful use of general anesthetics did surgery become the common practice that it is today. It is of considerable interest to know the actual extent to which surgical procedures are used in the population at present. Because of the lack of a population base to which operations may be related, no physician or hospital can arrive at any estimate of surgical operation rates per 1,000 population from their own records of surgical cases, no matter how carefully they may have been kept. An article in this issue, "The Frequency of Surgical Procedures in a General Population Group," by Selwyn D. Collins of the United States Public Health Service, presents for the first time data showing the frequency of surgical operations in an observed population of some 39,000 persons who resided in eighteen states representing all geographic sections. This study indicates that the highest operation rates occurred at 5-9 and 30-34 years of age; that operations were more frequent in large cities than in rural districts; and that the operation rate increased definitely with income.

• • •

Mortality is the principal index available to indicate progress in the application of sanitary science and modern medicine to the improvement of the health of the nation. Death rates for the total population have declined continuously for a half century and the average length of life has steadily lengthened. However, this improvement has not been shared equally by men and women nor by persons of different ages. The more advantageous position of women than of men who reach maturity with respect to their chances of living to a moderately advanced age is discussed in "Sex Differences in Mortality in the United States," by Dorothy G. Wiehl. The disparity in the mortality by sex has increased rapidly in the past fifteen years, and at young adult ages and in middle life it was

relatively greater in the United States in the period 1933-1935 than in several other countries.

. . .

There is a growing consciousness today that good health is not a natural heritage of rural living, and that the 4,000,000 pupils in the one and two-room schools still scattered throughout the United States have as great a need for a hygienic, comfortable school environment as have their city cousins. In the second of a series of articles, "Evaluation of a Rural School Health Education Project," Ruth E. Grout and Dr. C. A. Greenleaf, Director of the School Health Service in Cattaraugus County, evaluate the changes in environment which have been effected in the small rural schools of the County as the result of a school health program which has been carried on in the area since 1931.

. . .

Of tremendous interest to students of health and population will be Dr. Frank W. Notestein's analysis, revealing among other things a surprisingly high proportion of childlessness among Negro families. Dr. Notestein's article, "Differential Fertility in the East North Central States," is a preliminary report on some previously unpublished family data from the 1930 Census. The materials were made available to Princeton University's School of Public Affairs through the courtesy of Director Austin and Dr. Truesdell of the Bureau of the Census. The tabulations are confined to the East North Central States, and they deal with the number of children under age ten living at home for unbroken marriages of five to nine years' duration. Interesting comparisons are afforded by the grouping of data according to color and nativity of the household head, type of community, and value of home. He recommends that, in planning for the 1940 Census, serious consideration be given to the collection of data, at least in specific areas, relating directly and fully to the fertility of the natural family.

. . .

The fourth section of the series on "Impairments in a Rural Population" appears in this number. Previous sections have considered the prevalence of impairments collectively and the extent to which specific conditions occur in a whole population. The present section gives the prevalence of specific impairments at each period of life and shows that the two sexes may have quite different rates for certain impairments.

THE FREQUENCY OF SURGICAL PROCEDURES IN A GENERAL POPULATION GROUP¹

BASED ON RECORDS FOR 9,000 FAMILIES IN EIGHTEEN STATES VISITED
PERIODICALLY FOR TWELVE CONSECUTIVE MONTHS, 1928-1931

by SELWYN D. COLLINS

SURGICAL treatment of wounds and fractures is as old as civilization (19). There were some famous surgeons in the middle ages, but most operations were of a minor character and were done by barbers (18). The body cavities and the internal organs were rarely invaded by the surgeon before the development of aseptic procedures and the successful use of general anaesthetics. Joseph Lister, the great English surgeon, first used antiseptic procedures in 1865 (16), but it was several decades before surgery on the internal organs became the common practice that it is today (17).

Surgical operations have increased greatly in the present century; United States Army and Navy records indicate that there are now about twice as many operations per 1,000 men in those organizations as in 1910; that there are nearly three times as many appendectomies; and that there are approximately ten times as many tonsillectomies per 1,000 men as in 1910.

The Army and Navy medical departments are about the only organizations that give practically all medical service to the personnel under their care and observation; however, these groups are highly selected with respect to age, sex, and the availability of medical service. Because of the lack of a population base to which operations may be related, no physician or hospital can arrive at an estimate of surgical operation rates per 1,000 population from their own records of surgical cases, no matter how carefully they may have been kept.

¹ From Statistical Investigations, Division of Public Health Methods, National Institute of Health, United States Public Health Service. The author is indebted to Dr. Mary Gover for assistance in the preparation of this paper.

SOURCE AND CHARACTER OF DATA

In the study of illness in canvassed white families in 130 localities in eighteen states that was made by the Committee on the Costs of Medical Care (15) and the United States Public Health Service, all service received from physicians and other practitioners was recorded, including the nature of surgical procedures used. This record of all surgical operations for persons in the observed population affords data on the frequency of these procedures during the twelve months covered by periodic canvasses.

The composition and characteristics of the group of 8,758 families which were kept under observation for twelve consecutive months in the years 1928-1931 have been considered in some detail in the first report in the series (1). These families, including a total of 39,185 individuals, resided in eighteen states representing all geographic sections. Every size of community was included, from metropolitan districts to small industrial and agricultural towns and rural unincorporated areas.² With respect to income, the distribution was reasonably similar to the estimated distribution of the general population of the United States at the time of the survey.

Definition of Illness and of a Surgical Procedure. An illness, for the purpose of this study, was defined as any symptom, disorder, or affection which persisted for one or more days or for which medical service³ was received or medicine purchased. In general the illness record covers the ailments which the family informant remembered and designated as illness.

Provision was made for recording all surgical procedures that were done during the study year in connection with any illness. Since nurses made the periodic canvasses, it may be assumed that a more complete record of operations was obtained than would have been secured by visitors with no knowledge of surgical procedures.

² Every community that was included in the study had either a local health department or some other organization employing a visiting nurse; possibly the rural communities of this kind may have had somewhat more operations than those with no such organizations.

³ Exclusive of dental service, eye refractions, immunizations, and health examinations rendered when no symptoms were present.

The entry as made by the nurse was accepted without correction, except to use as surgical any case in which the diagnosis itself indicated that an operation had been done but not recorded as such on the schedule. Examples of these diagnoses are boil lanced, abscess drained, and fracture of the leg or other part of the body which would involve the setting of a bone or placing of a cast. The definition of a surgical procedure was necessarily inexact but in general it was the common conception of any treatment which involves the cutting of tissue or suturing of wounds, plus the setting of a bone or placing of a cast; while these latter procedures are seldom included in the definition of an operation, they are surgical in nature. Accidental injuries and childbirth were not considered surgical unless some specific surgical procedure was reported on the case; the use of forceps was not considered a surgical procedure. Operations and surgical cases as used in this study refer always to cases which actually had surgical treatment and do not include those sometimes designated as surgical even though no operation is performed.

FREQUENCY OF SURGICAL PROCEDURES IN THE WHOLE GROUP OBSERVED

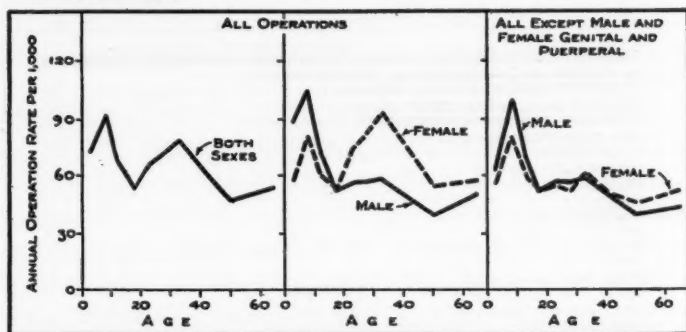
The frequency of surgical procedures in a given population group may be expressed, (a) as the annual number of operations per 1,000 persons under observation, or (b) as the percentage of cases that were treated surgically. This paper will be concerned chiefly, but not exclusively, with operation rates per 1,000 persons.

For the total of 38,544 person-years of observation there were 2,623 surgical operations, an annual rate (adjusted for age) of 65.0 operations per 1,000 persons. This includes surgery in connection with both primary and contributory causes of illness and in a few instances two or more operations in connection with the same diagnosis. The annual rate for sole or primary diagnoses that had surgery in connection with them was 60 per 1,000 (age corrected).

Of the total of 34,287 diagnoses (sole, primary, and contribu-

tory),⁴ 2,607, or 7.6 per cent, had surgery in connection with them. No surgery would occur on cases not attended by a doctor; the 2,607 cases treated surgically amounted to 9.7 per cent of the cases that had the care of a doctor. Of the total diagnoses, 13,259 were on illnesses that caused no loss of time from school, work, or other usual activities. In this group of nondisabling illnesses, only 372, or 2.8 per cent, of the cases were treated surgically. In the group of 21,028 disabling illnesses, 2,235 cases, or 10.6 per cent, were treated surgically; of the 17,003 disabling cases that were attended by a doctor, 13.1 per cent were treated surgically. The great majority of the disabling illnesses were also in bed for one or more days; of the group of 17,753 bed cases, 2,060, or 11.6 per cent, were treated surgically; of the 14,713 bed cases that were attended by a doctor, 14.0 per cent were treated surgically. Among the bed cases there were 2,661 that were hospitalized and of this group 1,596 or 60 per cent, were treated surgically. Looking at the matter from another viewpoint, 61 per cent of all surgical cases had hospital service and presumably the operation was done in a hospital.

Fig. 1. Frequency of all surgical operations among males and females of specific ages, 8,758 canvassed white families in eighteen states during twelve consecutive months, 1928-1931.



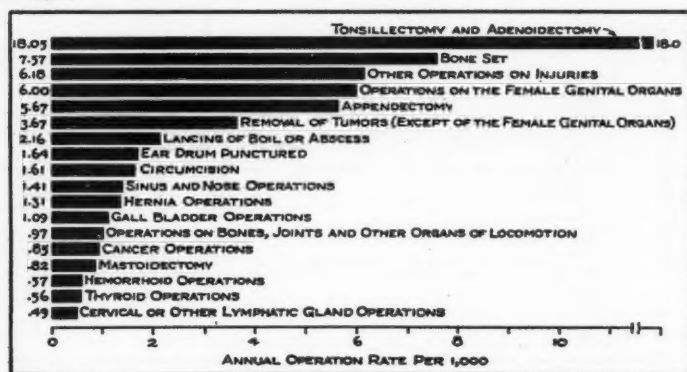
⁴ Throughout this paper the frequency of surgery is measured by the total number of operations regardless of whether the diagnoses on which they were done were sole, primary, or contributory. Duration and other items that measure severity, however, are based on sole diagnoses only.

Age and Sex. Figure 1 shows the age and sex incidence of all surgical operations. The adjusted rates are 62 and 68 per 1,000 for males and females, respectively. Since a considerable number of operations are done in connection with diseases and conditions not common to the two sexes, rates are shown also for all operations except those in connection with male genital and female genital and puerperal diagnoses. For all operations except those diagnoses the rates are nearly the same for the two sexes, 58 and 56 per 1,000 for males and females, respectively.

The age incidence of surgical operations shows two distinct peaks, at 5-9 and at 30-34 years. The earlier peak is largely accounted for by tonsillectomy and the latter by operations in connection with female genital and puerperal conditions; the adult peak in the curve for males is very small. When male and female genital⁵ and the puerperal conditions are eliminated from the comparison, the frequency of operations is almost identical for corresponding adult ages of the two sexes.

Surgical procedures include everything from a major abdominal

Fig. 2. Frequency of certain surgical operations among 8,758 canvassed white families in eighteen states during twelve consecutive months, 1928-1931. (Rates adjusted to the age distribution of the white population of the Registration States in 1930.)

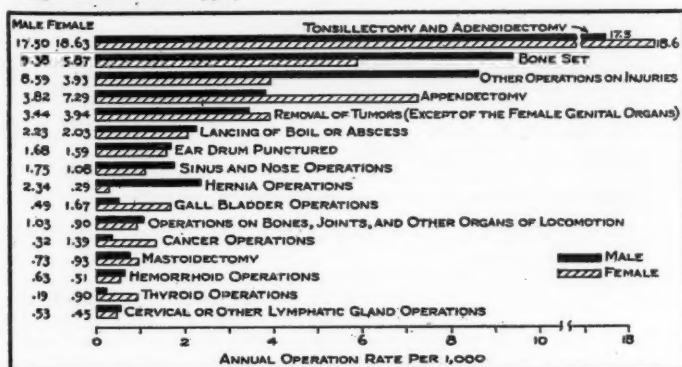


⁵ Female breast is classified in this study as a part of the female genital organs.

operation to the lancing of a boil or the removal of a wart. It is necessary to consider the various kinds of operations before the curves in Figure 1 have much meaning. Rates (adjusted for age) for different kinds of operations are shown in Figure 2. Tonsillectomy is by far the most frequent operation, constituting nearly one-third of the total number reported. The next two most frequent surgical procedures are the setting of a bone, and other operations in connection with injuries. If these two groups of surgical accident cases are considered as a unit, they amount to 20.3 per cent of all operations; when added to tonsillectomy (32.2 per cent), female genital and puerperal operations (8.3 per cent), and appendectomy (7.7 per cent), these four classes constitute about two-thirds of all operations. Figure 2 arrays thirteen other fairly specific kinds of operations.

It was noted earlier that the rate for all operations was about the same for adult males and females when those diagnoses that were not common to the two sexes were eliminated. Figure 3 shows rates (adjusted for age) for specific kinds of surgery among males and females. It is seen that there are wide differences between the

Fig. 3. Frequency of certain surgical operations among males and females in 8,758 canvassed white families in eighteen states during twelve consecutive months, 1928-1931. (Rates adjusted to the age distribution of the white population of the Registration States in 1930.)



sexes in the frequency of certain surgical procedures. The operations that show the largest relative differences between the sexes are hernia and sinus operations, and surgically treated accidents with higher rates for males; and appendectomy, gall bladder, cancer, and thyroid operations with higher rates for females. The rates for all cases (surgical and nonsurgical) of the last four diagnoses and also for sinusitis are higher for females than males, but hernia and accidents are definitely higher for males.

Table 1 and Figure 4 show for the more frequent surgical operations the age incidence for males and females separately. It is here seen that the similarity in age incidence in the two sexes for all operations common to both groups is also misleading; an extremely high rate of appendectomy among females of the young adult ages is balanced by high rates for operations in connection with injuries among males of those ages. The high operation rate for males in connection with injuries might be expected, in view of the greater incidence of industrial accidents among men and the greater frequency of accidents of all kinds among boys than among girls (14).

Appendectomy has its peak in the young adult ages for both males and females, but the rates are much higher for females. The excess of appendectomies among women is greatest at 20-24 years, but the relative difference is large at all ages above 5 years. One immediately thinks of the common practice of removing the appendix in connection with other abdominal operations, such as those on the female genital organs. Of the 136 appendectomies on females, thirty-seven had some other operation at the same time and twenty-six of these were in connection with female genital diseases; seventeen of these female genital operations would probably involve an abdominal incision, so the appendix may have been removed without clinical appendicitis. Even if it be assumed that the whole twenty-six cases were appendectomies without clinical appendicitis and are excluded, the reported appendectomy rate

| NATURE OF OPERATION AND SEX | ALL AGES ¹ | | | AGE | | | | | | | | | | |
|--|-----------------------|------------------------|-------|---------------------------------|-------|-------|-------|-------|-------|-------|-------|-------------|--|--|
| | No. of Operations | Ad-justed ² | Crude | Under 5 | 5-9 | 10-14 | 15-19 | 20-24 | 25-34 | 35-44 | 45-54 | 55 and Over | | |
| | | | | ANNUAL OPERATION RATE PER 1,000 | | | | | | | | | | |
| ALL OPERATIONS | | | | | | | | | | | | | | |
| Both Sexes | 2,623 | 64.97 | 68.05 | 72.2 | 93.1 | 65.0 | 52.1 | 66.1 | 75.3 | 63.1 | 46.3 | 53.4 | | |
| Male | 1,263 | 61.76 | 66.84 | 88.3 | 105.7 | 70.0 | 51.7 | 55.9 | 57.8 | 50.3 | 40.1 | 50.0 | | |
| Female | 1,360 | 67.57 | 69.29 | 55.9 | 80.8 | 60.0 | 52.5 | 73.5 | 88.3 | 75.9 | 53.8 | 56.9 | | |
| ALL OPERATIONS EXCEPT MALE AND FEMALE GENITAL ³ AND PUERPERAL | | | | | | | | | | | | | | |
| Both Sexes | 2,300 | 56.86 | 59.67 | 57.9 | 91.2 | 64.1 | 51.1 | 55.2 | 57.3 | 50.9 | 42.1 | 48.5 | | |
| Male | 1,159 | 57.62 | 61.34 | 60.9 | 101.8 | 68.2 | 51.1 | 55.9 | 57.5 | 50.3 | 39.0 | 43.2 | | |
| Female | 1,141 | 56.24 | 58.13 | 55.1 | 80.8 | 60.0 | 51.2 | 54.7 | 57.1 | 51.5 | 45.8 | 52.9 | | |
| Tonsillectomy and Adenoidectomy | | | | | | | | | | | | | | |
| Both Sexes | 845 | 18.05 | 21.92 | 27.0 | 55.1 | 31.1 | 15.4 | 14.2 | 13.1 | 9.9 | 6.0 | 2.4 | | |
| Male | 404 | 17.50 | 21.38 | 23.9 | 58.2 | 27.8 | 14.4 | 13.4 | 12.9 | 11.1 | 4.9 | 1.6 | | |
| Female | 441 | 18.63 | 22.47 | 30.6 | 52.2 | 34.4 | 16.4 | 14.7 | 13.3 | 8.8 | 7.3 | 3.2 | | |
| Ear and Mastoid Operations | | | | | | | | | | | | | | |
| Both Sexes | 123 | 2.46 | 3.19 | 8.7 | 7.2 | 2.2 | 2.3 | 1.9 | .9 | 1.0 | .3 | .4 | | |
| Male | 63 | 2.41 | 3.33 | 10.7 | 6.4 | 3.5 | 1.3 | 2.2 | .4 | .7 | — | — | | |
| Female | 60 | 2.52 | 3.06 | 6.7 | 7.9 | .9 | 3.3 | 1.6 | 1.2 | 1.4 | .7 | .8 | | |
| Appendectomy | | | | | | | | | | | | | | |
| Both Sexes | 202 | 5.67 | 5.24 | .5 | 2.5 | 6.8 | 9.8 | 11.3 | 9.6 | 5.4 | .9 | 3.6 | | |
| Male | 66 | 3.82 | 3.49 | .7 | 1.8 | 5.2 | 5.9 | 6.7 | 7.1 | 3.7 | .5 | 2.4 | | |
| Female | 136 | 7.29 | 6.93 | .4 | 3.1 | 8.4 | 13.8 | 15.5 | 11.4 | 7.1 | 1.3 | 4.9 | | |
| Miscellaneous Other Abdominal Operations | | | | | | | | | | | | | | |
| Both Sexes | 140 | 4.47 | 3.63 | 1.1 | .9 | .7 | 1.3 | 5.7 | 4.8 | 5.6 | 7.2 | 10.5 | | |
| Male | 71 | 4.81 | 3.76 | 1.1 | 1.8 | 1.3 | 2.0 | 3.4 | 5.4 | 3.0 | 7.6 | 14.5 | | |
| Female | 69 | 4.12 | 3.52 | 1.1 | — | — | .7 | 7.4 | 4.3 | 8.1 | 6.6 | 6.5 | | |
| Lancing of Boil or Abscess | | | | | | | | | | | | | | |
| Both Sexes | 83 | 2.16 | 2.15 | 2.5 | 1.2 | 1.3 | 3.9 | .9 | 3.5 | 2.2 | 1.2 | 1.6 | | |
| Male | 39 | 2.23 | 2.06 | 2.1 | 1.1 | 1.3 | 3.3 | 1.1 | 2.5 | 2.7 | 1.6 | 3.2 | | |
| Female | 44 | 2.03 | 2.24 | 3.0 | 1.4 | 1.3 | 4.6 | .8 | 4.3 | 1.7 | .7 | — | | |
| Removal of Tumors (Except Female Genital) | | | | | | | | | | | | | | |
| Both Sexes | 125 | 3.67 | 3.24 | 1.3 | 1.7 | 1.1 | 2.9 | 2.4 | 3.5 | 5.4 | 7.2 | 5.3 | | |
| Male | 58 | 3.44 | 3.07 | 1.1 | 2.1 | .9 | 3.3 | 2.2 | 3.8 | 5.4 | 4.3 | 5.6 | | |
| Female | 67 | 3.94 | 3.41 | 1.5 | 1.4 | 1.3 | 2.6 | 2.4 | 3.4 | 5.4 | 10.6 | 4.9 | | |
| Operations on Female Genital ³ Organs | | | | | | | | | | | | | | |
| Both Sexes | 219 | 6.00 | 5.68 | .4 | — | — | .7 | 10.9 | 17.9 | 12.1 | 3.6 | 2.0 | | |
| Female | 219 | 11.32 | 11.16 | .8 | — | — | 1.3 | 18.8 | 31.2 | 24.4 | 8.0 | 4.1 | | |
| Circumcision | | | | | | | | | | | | | | |
| Both Sexes | 94 | 1.61 | 2.44 | 14.0 | 1.9 | .9 | — | — | .2 | — | .3 | — | | |
| Male | 94 | 3.17 | 4.97 | 27.4 | 3.9 | 1.7 | — | — | .4 | — | .5 | — | | |
| Bone Set | | | | | | | | | | | | | | |
| Both Sexes | 296 | 7.57 | 7.68 | 6.5 | 12.1 | 11.4 | 6.6 | 5.7 | 4.6 | 6.4 | 4.8 | 10.9 | | |
| Male | 192 | 9.38 | 10.16 | 8.9 | 17.4 | 16.1 | 11.1 | 10.1 | 5.8 | 8.1 | 5.4 | 5.6 | | |
| Female | 104 | 5.87 | 5.30 | 4.1 | 6.9 | 6.6 | 2.0 | 2.4 | 3.7 | 4.7 | 4.0 | 16.3 | | |
| Other Operations on Injuries | | | | | | | | | | | | | | |
| Both Sexes | 236 | 6.18 | 6.13 | 4.7 | 6.1 | 5.5 | 4.9 | 7.1 | 8.0 | 6.1 | 6.6 | 6.1 | | |
| Male | 157 | 8.59 | 8.31 | 5.7 | 8.2 | 6.5 | 6.6 | 12.3 | 11.2 | 8.7 | 9.8 | 8.1 | | |
| Female | 79 | 3.93 | 4.03 | 3.7 | 4.2 | 4.4 | 3.3 | 3.3 | 5.6 | 3.4 | 2.7 | 4.1 | | |
| Miscellaneous Other Operations | | | | | | | | | | | | | | |
| Both Sexes | 260 | 7.13 | 6.75 | 5.4 | 4.4 | 4.1 | 4.3 | 5.7 | 9.2 | 8.9 | 8.3 | 10.5 | | |
| Male | 119 | 6.45 | 6.31 | 6.8 | 5.0 | 5.6 | 4.0 | 4.5 | 8.3 | 7.0 | 5.4 | 8.9 | | |
| Female | 141 | 7.92 | 7.17 | 4.1 | 3.8 | 2.6 | 4.6 | 6.5 | 9.9 | 10.8 | 12.0 | 12.2 | | |

¹ "All ages" includes a few of unknown age; "both sexes" includes a few of unknown sex.

² Adjusted by the direct method to the age distribution of the white population of the Registration States in 1930. Age adjustments of rates shown in the charts by income, size of city and other sub-groups used in this paper are made by the indirect method; for details see Tables 1 and 8 of preceding paper (11).

³ Female breast is classified in this study as a part of the female genital organs.

Table 1. Frequency of certain surgical operations among males and females of specific ages, 8,758 canvassed white families in eighteen states during twelve consecutive months, 1928-1931.

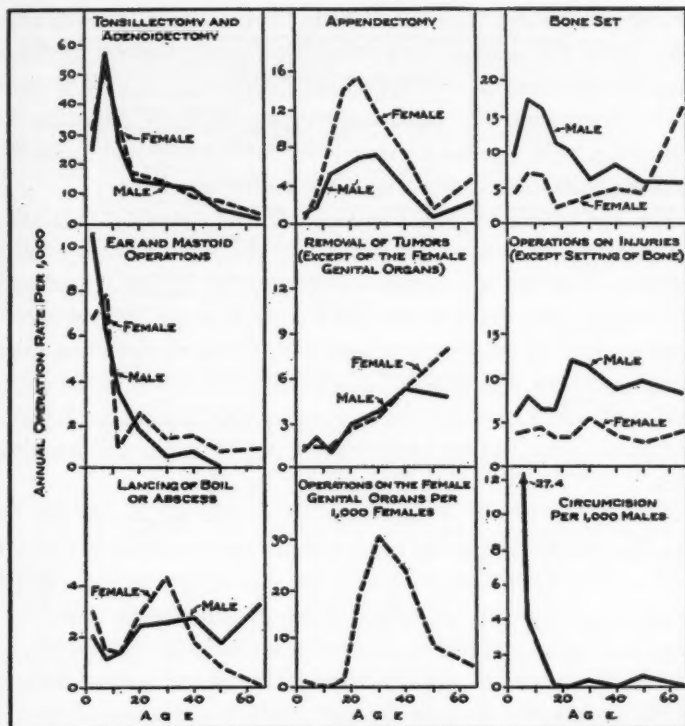


Fig. 4. Frequency of certain surgical operations among males and females of specific ages, 8,758 canvassed white families in eighteen states during twelve consecutive months, 1928-1931. (Scales are so made that the adjusted rate for all ages of both sexes represents an interval on the vertical rate scale that corresponds to 20 years on the horizontal age scale. In some instances the ages 15 to 24 are plotted as one group but shown in the table as two groups.)

for females would still be 60 per cent above that for males. If the removal of the appendix in connection with other operations is important in the excess of the recorded appendectomy rate for females, a considerable number of such removals must have been reported with no mention of the primary disease or operation.

Fractures are high among boys from 5 to 15 years but decrease

among men as age increases. Although on a lower level, there is also a peak for girls at 5 to 15 years but among women fractures increase with age, the rate being particularly high among women of the oldest ages. The relative age curves for other operations in connection with injuries are similar for males and females, but the rates for males are all much higher than for females.

The age curves for tonsillectomy, ear and mastoid operations, and removal of tumors are essentially the same for males and females. Tonsillectomy pertains chiefly to the late preschool and early school ages, the peak being at 6 years. Ear and mastoid operations are high in the preschool ages with markedly declining rates as age increases. Removal of benign tumors increases rather regularly with age. Operations in connection with female genital and puerperal conditions are concentrated largely in the childbearing ages.

A large part of the circumcisions were done under one year of age, the rate for that group being 116 per 1,000 males as compared with a rate of 12 for those who were one year of age, and rates under 10 per 1,000 for every other age group. Circumcisions under one month of age amounted to 110 per 1,000 male live births; if circumcisions continued at this frequency in the succeeding months of life, practically all male infants would be circumcised by the time they reached nine months of age.

In general the percentage of cases of a given diagnosis that were treated surgically varies relatively less with age and sex than the incidence of all cases or of surgical cases. For example, the percentage of appendicitis cases that were treated surgically is about the same for males and females of corresponding ages, although the incidence of all appendicitis and of appendectomy differs greatly for men and women. Otitis media and mastoid cases and operations are exceptionally high for children under 10 years of age, but the percentage of such cases that were surgically treated is about the same for young children as among young adults.

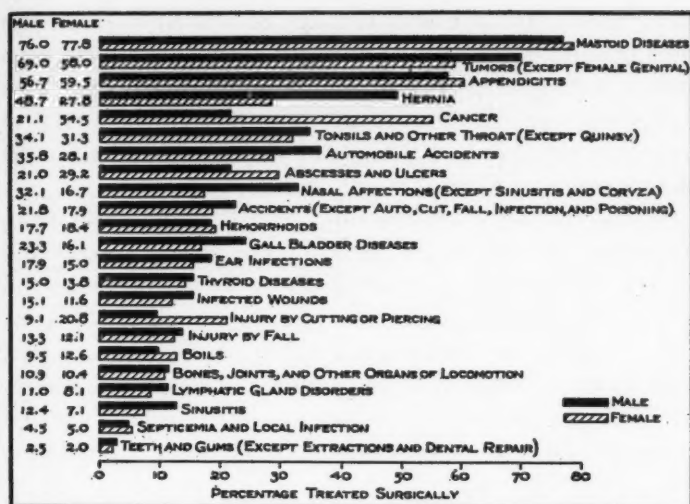


Fig. 5. Percentage of certain diagnoses that were treated surgically, males and females in 8,758 canvassed white families in eighteen states during twelve consecutive months, 1928-1931.

Figure 5 shows for males and females separately, the proportion of cases of twenty-three more or less specific diagnoses that were treated surgically. The incidence of all cases of hernia and of accidents of the various kinds is considerably greater among males than females, and in this chart it is seen that the proportion of these cases that are surgically treated is also greater for males, except for injury by cuts and lacerations. The excess for males is particularly large for hernia, a considerable proportion of which illnesses must be compensation cases. There are several diagnoses which show a high proportion with surgical treatment for males but not a high incidence of the total cases; among these are benign tumors, gall bladder, sinus infections and other nasal affections. There are several diagnoses with an especially high proportion of cases surgically treated for females, namely, cancer, abscesses, boils, and injuries by cuts and lacerations.

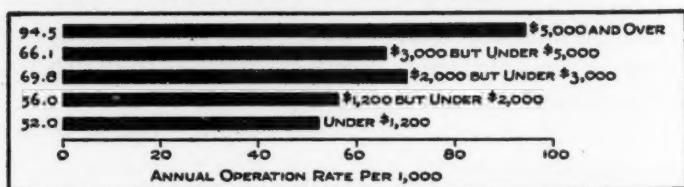
VARIATION IN THE FREQUENCY OF SURGICAL PROCEDURES
WITH ECONOMIC STATUS

The proportion of operations done in an emergency that demands immediate action to save life is not large; probably the majority are planned leisurely and done at a previously scheduled time. Because of the large number of nonemergency operations, one would expect more surgical procedures among the higher income families where funds are available for medical care that is not immediately necessary.

Data were obtained on the family's total income during the approximate year of the study. Figure 6 shows the frequency of operations in each of five income groups, with adjustment of the rates for age differences among the various groups. The rates vary from 52 operations per 1,000 persons in families with annual incomes of less than \$1,200 to 94 in families with \$5,000 or more income. Between these extremes there is a gradual increase with income in the frequency of operations, except for a slightly smaller rate in the \$3,000-\$5,000 class than in the next lower group. The percentage of cases that were treated surgically shows the same increase with income, from 6.6 per cent for the under \$1,200 group to 8.8 per cent for families with incomes of \$5,000 or more. The increase with income in the frequency of operations persists when the data are considered for cities of different sizes.

Figure 7 shows operation rates for persons of specific ages for

Fig. 6. Frequency of all surgical operations among persons classified according to total annual family income, 8,758 canvassed white families in eighteen states during twelve consecutive months, 1928-1931. (Rates adjusted to the age distribution of the white population of the Registration States in 1930.)



the lowest and highest income groups. The differences between these two extreme groups are large and consistent in the various ages and the general tendency toward more surgery in the higher income brackets is fairly clear. The percentage of cases of specific ages that were treated surgically gives a similar picture but the relative differences between the two income groups are not as great as in the actual operation rates.

Figure 8 shows rates for each income group for eight fairly specific types of operations; in the lower half of the figure the rates are plotted on an actual basis, and in the upper half on a relative basis as ratios to the rate for the group with less than \$1,200 annual income. Most of the operations show some tendency toward greater frequencies in the higher income groups. The operations that show the largest and most definite differences are tonsillectomy, removal of tumors, ear and mastoid operations, and lancing of boils. These surgical procedures are not usually done as emergencies; the tumor category is predominated by minor external tumors that do not endanger life, and the mastoid cases are a small part of the ear group. Moreover, the rupture of the ear drum in otitis media is a frequent outcome when surgical procedures are not used; by this outcome, the emergency is ended without surgery, although the result may be a permanent impairment.

Bone setting was more frequent in the lower income groups. Every fracture carries with it the implication of the setting of the

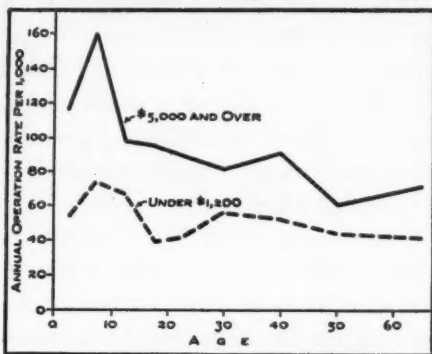


Fig. 7. Frequency of all surgical operations at specific ages among persons with high and with low total annual family income, 8,758 canvassed white families in eighteen states during twelve consecutive months, 1928-1931.

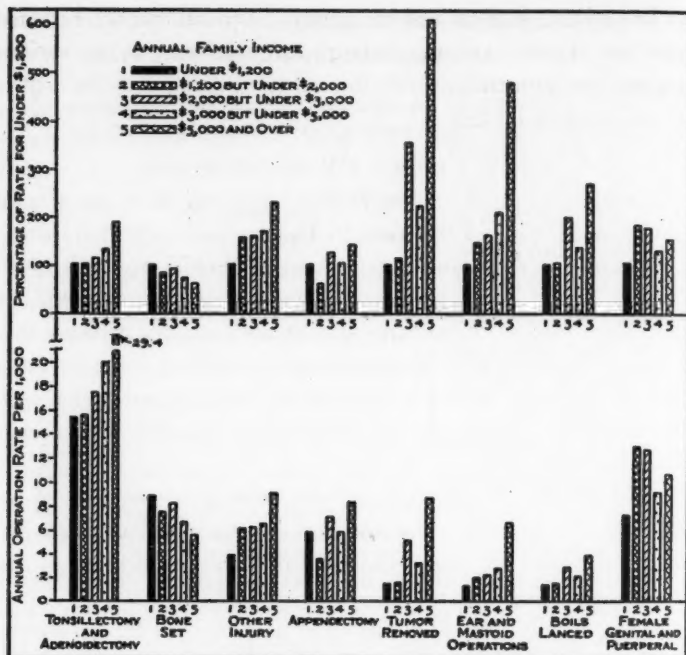


Fig. 8. Frequency of certain surgical operations among persons classified according to total annual family income, 8,758 canvassed white families in eighteen states during twelve consecutive months, 1928-1931. (Rates adjusted to the age distribution of the white population of the Registration States in 1930.)

bone or the placing of a cast, so the frequency of this operation really represents the frequency of accidents involving a fracture. Since accidents, particularly industrial accidents, occur more frequently in the lower income groups, the incidence of this operation might be expected to be less in the higher income brackets. Operations in connection with injuries that do not involve fractures are more frequent in the higher income groups but when all surgery on injuries is considered together, there is not much variation with income in the rate for all ages; among children under 20 years there are more operations in the higher income groups.

The percentage of cases of the various diagnoses that were treated surgically shows about the same picture, but with relatively less variation with income.

VARIATION IN THE FREQUENCY OF SURGICAL PROCEDURES

WITH SIZE OF CITY AND GEOGRAPHIC AREA

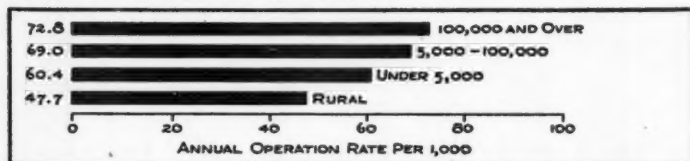
Physicians are more concentrated in large cities than the general population; a study of ten states by Peebles (20) indicated that 53 per cent of the physicians were practicing in cities over 100,000 in population, whereas only about 40 per cent of the population of these states lived in cities of that size. In addition it was found that the percentage of practicing physicians who limited themselves to a specialty increased regularly with size of city; the percentage who were specialists in cities over 100,000 was more than four times what it was in places under 10,000.

Hospital beds are also concentrated in large cities with corresponding scarcity in the rural districts. Thus surgeon specialists and hospital facilities are more plentiful and more convenient to the inhabitants of large cities.

Geographically, both physicians and hospital beds are less plentiful (in proportion to population) throughout the South than in other sections.

Size of City. Figure 9 shows operation rates for cities classified according to size.⁶ Considering this chart for the whole group of

Fig. 9. Frequency of all surgical operations in cities of different sizes and in rural areas, 8,758 canvassed white families in eighteen states during twelve consecutive months, 1928-1931. (Rates adjusted to the age distribution of the white population of the Registration States in 1930.)

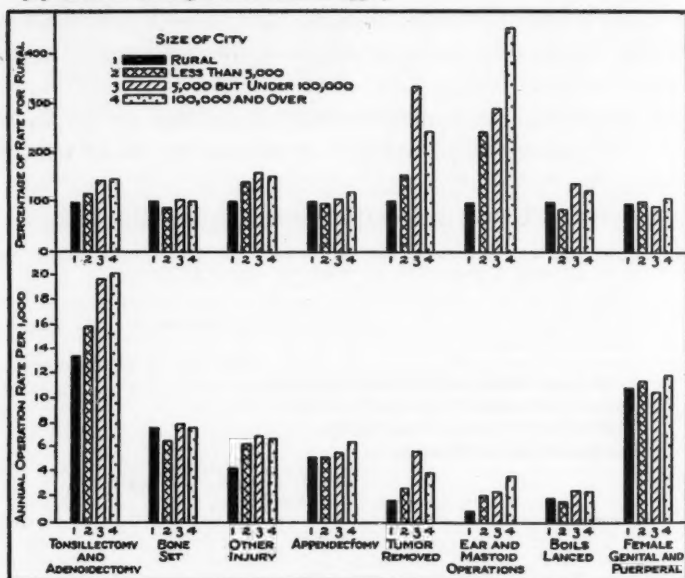


⁶ In a survey of this kind no error arises from the place of the operation being different from the place of the patient's residence, because all the data about a given family are classified according to the place of the family's residence.

families there is a regular progression from an operation rate of 48 in the rural areas to 73 per 1,000 in cities of 100,000 or over in population. The percentage of cases that were treated surgically also increases regularly from 6.0 per cent for rural families to 9.0 for those living in cities of 100,000 or over. When one compares the surgical operation rates per 1,000 in cities of 100,000 or over with those for corresponding ages in rural areas, the differences are large for every age group.

Figure 10 shows rates for specific kinds of operations in the several types of communities. Most of the operations show tendencies toward higher rates in large cities, but the variations are not equally large and consistent for the several diagnoses. Ton-

Fig. 10. Frequency of certain surgical operations in cities of different sizes and in rural areas, 8,758 canvassed white families in eighteen states during twelve consecutive months, 1928-1931. (Rates adjusted to the age distribution of the white population of the Registration States in 1930.)



sillectomy shows a regular progression from 13 in the rural areas to 20 per 1,000 in large cities, but for appendectomy there is much less difference between the country and the city. Possibly appendicitis represents an emergency which must be taken care of, but tonsillectomies are performed more frequently when facilities are available and convenient. The sizable excess in cities for operations to remove benign tumors, cysts, and warts seems to bear out this hypothesis, since such chronic conditions rarely come up as emergency situations. On the other hand, operations in connection with ear diseases show a large relative excess for cities and one would think that many of these operations would be done as emergencies. It is an emergency, however, that is frequently overlooked and the eardrum left to rupture without surgical interference.

Operations on the female genital organs are often done in connection with conditions resulting from childbirth; because the birth rate is higher in rural areas the need for such operations is probably greater there, but the rates show little variation with size of city.

The increase in the frequency of operations with size of city is fairly consistent for each geographic area; however, the differences between city and rural rates are greater in the South and West than in the North Central and Northeast.

SEVERITY AND MEDICAL CARE OF SURGICAL CASES

Hospital, Clinic, and Specialist Services. Considering all operations, 61 per cent of the cases had some hospital service and presumably the operation was done in the hospital. Of the 39 per cent that had no hospital service, 30 per cent of all operations had only office or clinic calls with no home calls, so the operation must have been done in the office or clinic; the other 9 per cent had home calls but no hospital service, so the operation was done either at home or in the office or clinic. All operations for gall bladder, hernia, and thyroid, and 99 per cent of the appendectomies were hospital cases.

The figure of 61 per cent of all surgical cases that were hospitalized may be contrasted with 3.4 per cent of all nonsurgical cases; 4.4 per cent of nonsurgical cases that had a doctor in attendance were hospitalized. Of interest also is the fact that 60 per cent of all hospital cases had surgical operations, as compared with 3.2 per cent of all nonhospital cases; 4.2 per cent of all nonhospital cases that had a doctor in attendance had an operation. Hospitalization is frequent in surgical practice and surgery looms larger in hospital than in nonhospital medical practice.

Of all surgical cases, 10.1 per cent received some service from a public clinic in connection with the illness, as compared with 3.3 per cent for all nonsurgical cases; 4.3 per cent of the attended nonsurgical cases had public clinic service.

In 43 per cent of all the operations the surgical work was reported as done by a specialist, in comparison with only 10 per cent of nonsurgical attended cases that had a specialist as a medical attendant. The other 57 per cent of the operations were done by physicians not designated as specialists, including 12 per cent that were done by hospitals or clinics with no other information about the person who operated. Fifty-three per cent of all operations in hospitals were done by specialists, as compared with 27 per cent of those done outside of hospitals.

Nursing Service. Twenty-five per cent of the hospital surgical cases had one or more special nurses for at least one day, and 9 per cent had two or more special nurses (day and night) for one or more days. These percentages may be contrasted with 17 per cent of nonsurgical hospital cases that had one or more special nurses, and 6 per cent that had two or more.

The mean duration of special nursing in the hospital was 2.9 days per hospital surgical case and 11.5 days per hospital surgical case with a special nurse.⁷ The proportion of hospital surgical cases

⁷ In both of these averages a day refers to the work of one nurse during a day or night or both; two nurses (day and night) on the same case were counted as two days of nursing, but one nurse said to be on duty both day and night was counted as only one day of nursing.

that had a special nurse varies from 5 per cent for circumcisions and 10 per cent for tonsillectomies to 36 per cent for operations on the female genital organs, and 52 per cent for appendectomies.

Considering all cases⁸ without respect to hospitalization, 16.3 per cent of surgical cases had a full-time bedside nurse (graduate or practical) for one or more days, as compared with 2.1 per cent of all nonsurgical cases. However, the services of the regular floor nurse in the hospital should be taken into account; of the total surgical cases 61.7 per cent were either in a hospital (and therefore had nursing care) or had the services of a full-time bedside nurse outside of the hospital, as contrasted with 4.9 per cent for all nonsurgical cases.

Of all surgical cases, 5.0 per cent had one or more visits from a visiting nurse; this may be compared with 3.7 per cent of nonsurgical cases that had such service. The service on surgical cases amounted to 0.42 visits per total case and 8.5 visits per case with a visiting nurse. Nursing visits as here defined include visits for any purpose and from all types of organizations.

Durations of Illness and of Hospital Service. Average durations⁹ in the hospital and in bed were computed for illnesses that had surgical treatment. Since the duration of the case may have been materially increased by complicating affections, the means here shown are for illnesses with only a single diagnosis.

Considering all hospital operations with only one diagnosis, the average duration in the hospital was 8.2 days. At the top of the list

⁸ Inasmuch as the operations included sole, primary, and contributory diagnoses, the percentages here and in other paragraphs for nonsurgical cases also refer to all three kinds of diagnoses; the results are not essentially different when contributory diagnoses are eliminated.

⁹ Theoretically, statistics on the duration of illness should exclude all incomplete cases and be based only on those closed either by death, recovery, or other discharge from the hospital or discontinuance of confinement to bed. In this study, however, the only available records were durations during the twelve-month period of observation; in such data the incomplete cases represent a selected group with longer than average durations because the longer the duration the more probable it is that the case will still be sick on the closing date of the study year. On the other hand, some illnesses of short duration may represent cases with onset prior to the beginning of the study that extended only a short time within the study year.

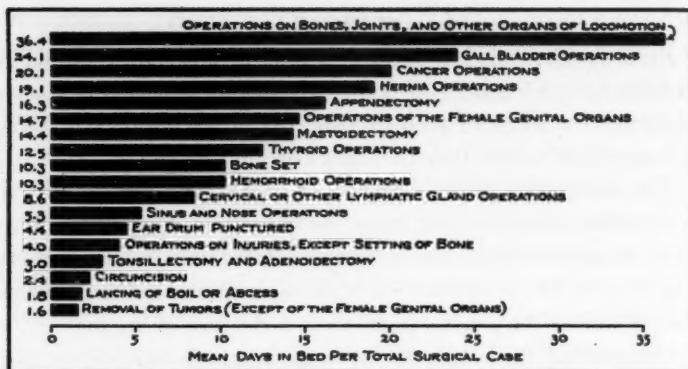


Fig. 11. Average days in bed on account of illness in connection with certain surgical operations, 8,758 canvassed white families in eighteen states during twelve consecutive months, 1928-1931. (These means represent the average time in bed both before and after operation for all cases with only one diagnosis, including those not in bed at all.)

are operations on the bones, joints, and organs of locomotion, 27 days; cancer, 25 days; gall bladder, 22 days; and at the bottom is tonsillectomy with 1.7 hospital days per hospitalized case although 75 per cent were done in a hospital.

Figure 11 shows for eighteen more or less specific kinds of operations the mean time in bed for all cases, including those not in bed as well as those confined to bed. It thus represents the average severity of all cases of a given operation with only one diagnosis. At the head of the list with an average of 36 days in bed are operations on the bones, joints, and other organs of locomotion. Following this comes gall bladder operations with a mean of 24 days in bed; cancer, 20 days; hernia, 19 days; and appendectomy, 16 days in bed. At the other end of the list are the minor operations that cause little or no time in bed, including the removal of benign tumors, except of the female genital organs, 1.6 days; and lancing of a boil or abscess, 1.8 days in bed. The most frequent of the short duration cases are tonsillectomies with an average of 3.0 days in bed; since this operation constitutes nearly one-third of the total, the duration for all operations combined is short, 7.7 days in bed.

SUMMARY

Records of all surgical operations were obtained for 8,758 white families in 130 localities in eighteen states for a period of twelve consecutive months between 1928 and 1931. Each family was visited at intervals of two to four months to obtain the data.

The surveyed families include representation from nearly all geographic sections, from rural, urban, and metropolitan areas, from all income classes, and of both native and foreign-born persons. The distribution by income was reasonably similar to the estimated distribution of the general population at the time of the survey.

Considering the whole surveyed group there were 65 surgical operations per 1,000 persons per year. The rates for males and females were 62 and 68 per 1,000, respectively. The highest rates occurred at 5-9 and 30-34 years of age. The first peak is largely accounted for by tonsillectomy and the second by female genital and puerperal conditions (Fig. 1).

Tonsillectomy constituted nearly one-third of all operations. The setting of a fractured bone was second in frequency; other operations in connection with injuries, third; operations on the female genital organs, fourth; and appendectomy fifth in frequency (Fig. 2). The age curves of the various types of operations differ radically (Fig. 4).

The setting of a fractured bone, other operations in connection with injuries, hernia, and sinus operations were all definitely higher among males than females. Appendectomy, gall bladder, cancer, and thyroid operations were higher among females (Fig. 3).

The frequency of operations increased definitely with income (Fig. 6). The largest relative variations with income occurred in the removal of tumors and ear and mastoid operations (Fig. 8).

Operations were more frequent in large cities than in rural districts (Fig. 9).

Sixty-one per cent of all operations had some hospital service; the other 39 per cent were done in the office or clinic or at home.

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SEX DIFFERENCES IN MORTALITY IN THE UNITED STATES¹

by DOROTHY G. WIEHL

THE continued decline in the gross mortality rate in the United States since 1930 has been cause for satisfaction, especially in view of the distressing economic hardships which have been experienced by a large portion of the population. Gross rates, however, give an average picture of mortality which conceals the great inequalities in the extent to which various groups in the population share in the reduced mortality. Furthermore, since the population is aging and immigration of young adults has stopped, comparison of the crude average mortality in recent years with that for earlier years provides a very inaccurate index of the mortality changes. In the present report, recent trends in the mortality for specific sex-age groups are considered. Special attention is given to differences in mortality by sex, because the widening disparity between the death rates for males and females suggests a situation with respect to health conditions in this country which merits consideration. Some excess mortality among males as compared with females is a universal phenomenon, but the difference has been steadily increasing in the United States for the past thirty-five years and the increase in this excess has been especially rapid in the past fifteen years. This trend for males to share less than females in the improvement in mortality which is taking place cannot be neglected in the planning of health programs to extend the gains already made in the postponement of death and, should it continue, may have definite significance to the social and economic problems of our national life.

The decline in mortality² for each sex since 1929 is apparent in

¹ From the Milbank Memorial Fund.

² The mortality data used in this study, except when otherwise specified, relate to the thirty-four states and the District of Columbia which were in the death registration area of 1920 and comprised 81.4 per cent of the population of the United States in 1930.

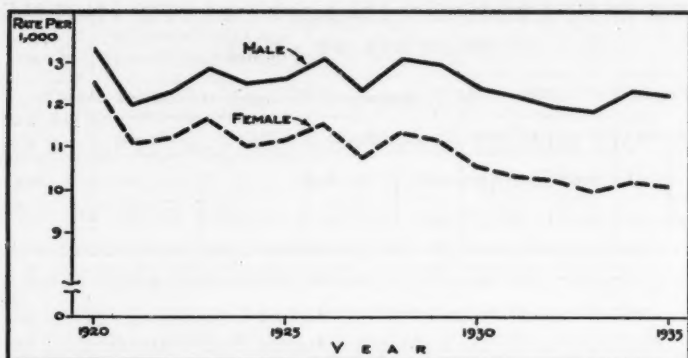


Fig. 1. Annual death rates (crude) for males and females in the Registration States of 1920, including the District of Columbia, for the period 1920-1935.

Figure 1, which presents the crude annual death rates since 1920. In the years before 1930, there was a slight upward trend evident in the male death rates but since 1930 the rates have shown a tendency to decline. The lowest rate, 11.9 in 1933, was, however, only one per cent less than the rate in 1921, the year in which the previous low rate was recorded. On the other hand, the death rate for females has shown a downward trend for the entire period since 1921 and each year's rate since 1930 has been lower than any rate recorded from 1921 to 1929.

The decline in the mortality for each sex in recent years is significantly increased if the total rates for all ages are adjusted to the same age distribution, thus eliminating the effect of a larger proportion of older persons in the population in the most recent years. In Table 1, crude and adjusted rates for each sex are shown for three calendar periods, 1921-1923, 1927-1929, and 1933-1935. When the latest period is compared with the earliest, the mortality for males (adjusted) shows a decline of 8.6 per cent as against 18.0 per cent for females. The greater decrease in the female death rate than in the male death rate naturally increased the difference between the rates; so that in the years 1933-1935 the male rate exceed-

| CALENDAR PERIOD | DEATH RATE PER 1,000 POPULATION | | | | PER CENT CHANGE IN ADJUSTED RATES BETWEEN 1921-1923 AND LATER PERIODS | | EXCESS MORTALITY FOR MALES PER CENT |
|-----------------|---------------------------------|-----------------------|--------|-----------------------|---|---------|-------------------------------------|
| | Male | | Female | | Males | Females | |
| | Crude | Adjusted ¹ | Crude | Adjusted ¹ | | | |
| 1921-1923 | 12.40 | 12.31 | 11.30 | 11.15 | - | - | 10.4 |
| 1927-1929 | 12.80 | 12.48 | 11.06 | 10.64 | +1.38 | - 4.57 | 17.4 |
| 1933-1935 | 12.14 | 11.25 | 10.07 | 9.14 | -8.61 | -18.03 | 23.2 |

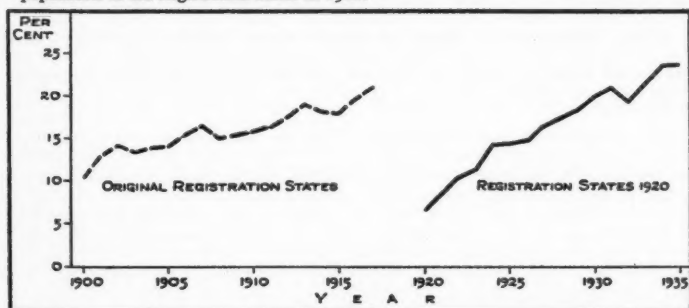
¹ Adjusted to the age distribution of the total population of the 1920 Registration States according to the census, January 1, 1920. Deaths of unknown age are included in the total adjusted rate.

Table 1. Mortality by sex in the 1920 Registration States and the District of Columbia at three calendar periods, 1921-1923, 1927-1929, and 1933-1935.

ed the female rate by 23 per cent whereas in 1921-1923 the excess was 10 per cent.

The steady increase in the excess in mortality among males as compared with that among females is shown strikingly in Figure 2 in which have been plotted the percentages by which the annual adjusted rates for males were greater than the rates for females. In 1920, the excess mortality for males was 6 per cent but in 1935 it was 24 per cent. It is clear from the chart that there has been a consistent increase in the difference between the sex-specific rates which has persisted in years in which the male rates showed a decline as well as in years when the male rate increased.

Fig. 2. Percentage excess in male mortality over female mortality after annual rates for each sex in each year were adjusted to the age distribution of the total population of the Registration States of 1920.



It is of interest to compare the differences between the sex-specific rates since 1920 with those shown by the mortality experience in earlier years. This comparison is made in Figure 2, which indicates the percentage excess in the male rates for the population of the Original Registration States for each year from 1900 to 1917,³ inclusive. The excess is based on sex-specific rates which were adjusted to the same age distribution used in the adjusted rates for the period 1920-1935, namely, the total population of the 1920 Registration States according to the census of January 1, 1920. A gradually increasing excess mortality for males is found to have characterized this earlier period, the percentage excess in the male death rate having increased from about 10 per cent in 1900 to 21 per cent in 1917. The comparatively small difference in the rates by sex noted in 1920 and several succeeding years for the Registration States of 1920 was true also for the Original Registration States. This abrupt change in the ratio of the male rate to the female rate is associated with a sharp drop in the death rate to a level considerably below the pre-war rates. The decline was greater for males than for females, the average death rate for males in 1920-1921 being 15 per cent below the rate for 1915-1916 and for females only 7 per cent. The sudden decline in the death rate for males in these years has been a very puzzling phenomenon for which no satisfactory explanation has been offered.⁴ The excess mortality for males rapidly increased again and in 1934 and 1935 it was higher than that recorded for any

³ Rates for the years 1918 and 1919 have not been used because of the difficulty of estimating accurately the male population in these years due to the withdrawal of large numbers of males from civil life during the World War. The Original Registration States include the six New England States and New York, New Jersey, Indiana, Michigan, and the District of Columbia.

⁴ It is of interest to note that the relatively greater change in the male death rate was limited to the age groups between 15 and 75 years of age. At ages 20 to 34 years, the death rate for males in 1920-1921 was 17 per cent below that in 1915-1916 but the rates for females increased slightly; at ages 35 to 54 years, the rates for males and females declined 24 per cent and 9 per cent, respectively; and at ages 55 to 64 years the percentages were 16 and 8. During the war, several million men in the younger adult ages had been under a regime of physical training, had received immunizing treatments, and many had physical defects corrected. It is possible that this experience contributed to the lower death rate in the years immediately following the war period, but other factors also must have been involved since the improvement in the male death rate shows an excess at older ages.

pre-war year. But the comparatively favorable ratio of the mortality among males to that among females in the first part of the last decade demonstrates the possibility of extending the improvement in the mortality among females to the mortality among males.

SEX DIFFERENCES AT SPECIFIC AGES

The problem of sex differences in mortality is further defined when these differences are considered by age or when the unfavorable mortality experience of males is located at specific ages. The basic data for such an analysis are presented in Table 2 and Figure 3 which give the sex-age specific death rates for the periods 1921-1923, 1927-1929, and 1933-1935, the latter being the latest years for which deaths by sex and age are available.

Some of the more significant indications to be obtained by a study of Figure 3 may be summarized briefly:

Table 2. Sex-age specific mortality in the 1920 Registration States and the District of Columbia at three calendar periods, 1921-1923, 1927-1929, 1933-1935, and the percentage excess in mortality of males at each period.

| AGE GROUP | DEATH RATE PER 1,000 POPULATION ¹ | | | | | | PER CENT THAT THE MALE RATE WAS ABOVE OR BELOW THE FEMALE RATE | | |
|--------------|--|---------|---------|---------|---------|---------|--|---------|---------|
| | Male | | | Female | | | | | |
| | 1921-23 | 1927-29 | 1933-35 | 1921-23 | 1927-29 | 1933-35 | 1921-23 | 1927-29 | 1933-35 |
| ALL AGES | 12.40 | 12.80 | 12.14 | 11.30 | 11.06 | 10.07 | + 9.7 | +15.7 | +20.5 |
| 0-4 | 25.09 | 21.33 | 15.85 | 20.96 | 17.21 | 12.64 | +19.7 | +23.9 | +25.4 |
| 5-14 | 2.45 | 2.12 | 1.66 | 2.10 | 1.72 | 1.32 | +16.9 | +23.1 | +25.9 |
| 15-24 | 3.81 | 3.62 | 2.82 | 3.81 | 3.44 | 2.43 | 0 | + 5.4 | +16.1 |
| 25-34 | 5.03 | 5.01 | 4.15 | 5.12 | 4.73 | 3.62 | - 1.6 | + 6.0 | +14.6 |
| 35-44 | 7.38 | 7.82 | 7.00 | 6.67 | 6.50 | 5.39 | +10.6 | +20.4 | +29.9 |
| 45-54 | 12.14 | 13.74 | 13.38 | 10.85 | 10.99 | 9.80 | +11.9 | +25.1 | +36.4 |
| 55-64 | 24.55 | 27.12 | 26.41 | 21.56 | 21.82 | 20.02 | +13.9 | +24.3 | +31.9 |
| 65-74 | 53.61 | 58.06 | 56.54 | 48.41 | 49.27 | 46.21 | +10.7 | +17.8 | +22.4 |
| 75 and Older | 133.30 | 142.09 | 141.00 | 129.24 | 132.89 | 127.96 | + 3.1 | + 6.9 | +10.2 |

¹ The populations for each sex and age group in the years between 1920 and 1930 were estimated by the arithmetic method from the censuses of 1920 and 1930. The population in 1935 was estimated by advancing the population of each five-year sex-age group according to the 1930 census to the next higher five-year age group and deducting the deaths that would have occurred in the intervening five-year period; for the years between 1930 and 1935 the populations were obtained by the usual arithmetic method. Exceptions to this procedure were the estimates for the age group 5-9 in 1935 which was corrected for underenumeration of the population under 5 years of age in 1930 and the age group under 5 years in 1935 for which estimates made by the Scripps Foundation, Oxford, Ohio, were used. Rates for the age group under 5 years are based on the census population or its equivalent. Populations were adjusted to July 1st of each year.

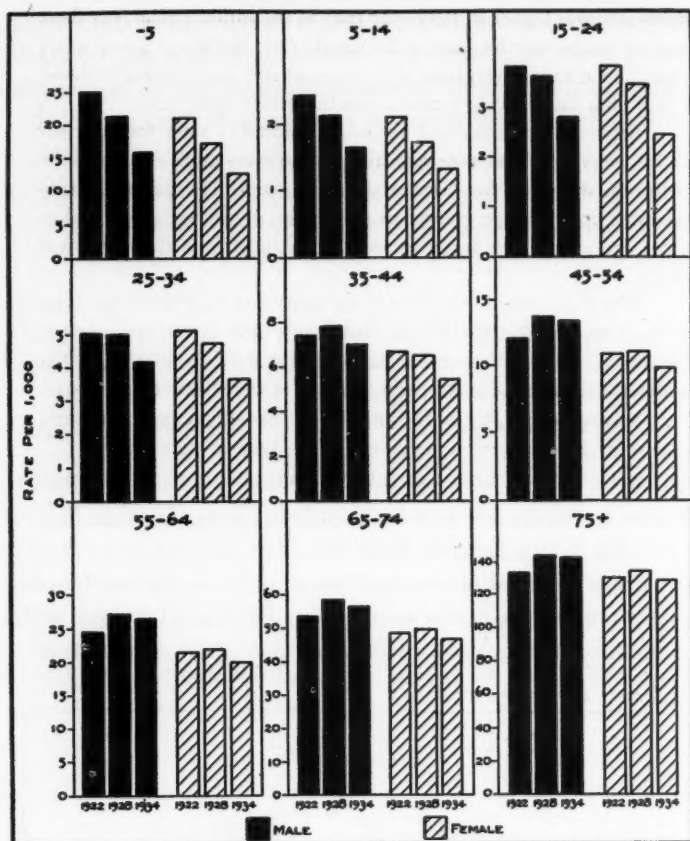


Fig. 3. Sex-age specific mortality in the Registration States of 1920 at three calendar periods, 1921-1923, 1927-1929, and 1933-1935. Note that the vertical scale at each group is different; equal differences between the length of the bars for any age group represent roughly equal proportionate differences in rates.

1. For age groups under 25 years of age, mortality for each sex shows a progressive decline from one calendar period to the next, although the decline was less between 1921-1923 and 1927-1929 than between 1927-1929 and 1933-1935.

2. At ages 35-44 years and for each older ten-year age group, the male

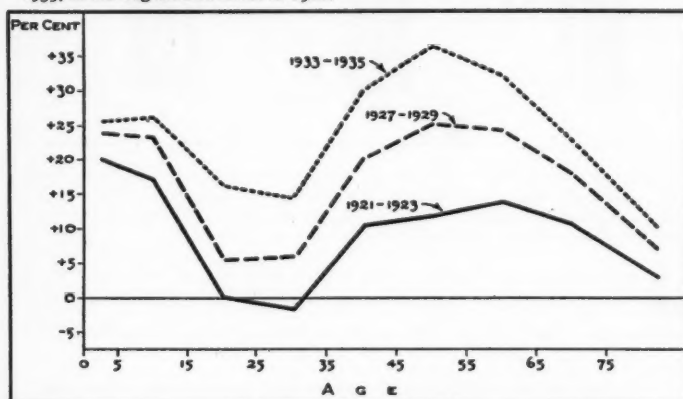
death rate was higher in 1927-1929 than in the earlier period, but there was no comparable increase in the female rate. In the age group 45-54 years, and at successively older ages, the mortality among females shows a slight but insignificant increase over the period 1921-1923.

3. Between 1927-1929 and 1933-1935, mortality rates for each sex and at every age show some reduction, but in every adult age group the reduction is greater for females than for males. The decline is considerable up to the age group 45-54 years but, in this age group and in older age groups, the improvement in the death rate for males was slight.

4. When the rates for 1933-1935 are compared with those for 1921-1923, it appears that the female death rates were lower in 1933-1935 at every age, although the differences are slight at the advanced ages. For males, the death rates in the period 1933-1935 were lower than in 1921-1923 only up to age 45, and the rates for the age group 45-54 years and each older age group were definitely higher than in 1921-1923.

The net effect of these age-specific changes on the comparative mortality for males and females at each age is portrayed in Figure 4 and Table 2. It is apparent from this chart that the progressively wider disparity noted in the total mortality for males and females has occurred to some extent at every age. There are, however, wide

Fig. 4. Percentage that the male death rate was above or below the female death rate at specific ages in three calendar periods, 1921-1923, 1927-1929, and 1933-1935, in the Registration States of 1920.



differences in the proportionate excess mortality for males at various ages and in the extent of the change in the period between 1921-1923 and 1933-1935. The excess in each of the three periods is relatively great in childhood and middle life, lower in the young adult ages between 15 and 34 years of age, and also at advanced ages, 75 years and over. The increasing excess in the mortality among males, however, is especially significant and this has been most striking in the young adult ages and has continued through the older middle age groups.

The percentage excess of mortality for males was at a maximum in the age group 45-54 in 1933-1935 when it was 36 per cent higher than the female mortality. At these ages, the excess had been only 12 per cent in 1921-1923. Nearly as great an excess is found in the age groups 35-44 years and 55-64 years and the increase over 1921-1923

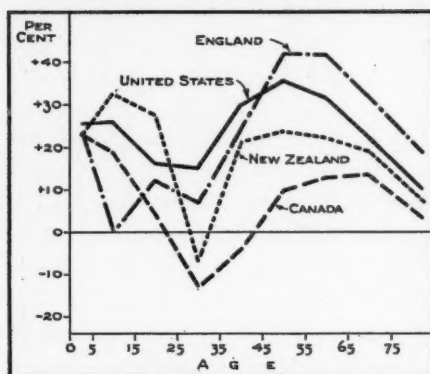


Fig. 5. Percentage that the male death rate was above or below the female death rate at specific ages in the United States (Registration States of 1920), 1933-1935, in England and Wales, 1934, in Canada, 1930-1932, and in New Zealand, 1930-1932.

also was similar. At ages 15-24 years and 25-34 years, the excess of mortality for males was about 15 per cent in 1933-1935. Although slightly less than half the excess at older ages, it represents an actual increase that is nearly as great since the male rate at ages 25-34 years was a little lower than the female rate in 1921-1923.

Several questions concerning the significance

of the excess of mortality for males naturally arise. Is this excess in the United States unusual or does it represent a natural condition to be found in other countries? Is this excess associated with an ex-

ceptionally favorable mortality among females in recent years or is the mortality for males unduly high? Some evidence on these questions is presented in Figures 5 and 6 which compare the situation in the United States with that in Canada, England and Wales, and New Zealand. The mortality data used do not refer to the same years for each country, but that does not affect the validity of these comparisons. For Canada and New Zealand, sex-age specific mortality in the years 1930-1932⁵ have been used and for England and Wales, the data refer to the year 1934.⁶ The mortality rates in these countries by sex for all ages and adjusted to the age distribution of the population of the 1920 Registration States were as follows:

| | <i>Death Rate per 1,000 Adjusted for Age</i> | |
|-------------------|--|---------------|
| | <i>Male</i> | <i>Female</i> |
| United States | 11.25 | 9.14 |
| England and Wales | 10.75 | 8.58 |
| Canada | 10.03 | 9.13 |
| New Zealand | 8.27 | 7.09 |

The mortality in the United States in the period 1933-1935 was somewhat higher than that in Canada and England and Wales in the periods compared, and much higher than that in New Zealand which has the lowest mortality of any country.

The per cent that the mortality among males at specific ages was greater or less than the mortality for females is shown for each country in Figure 5. The great differences between these countries gives no support to an hypothesis that there is a normal or expected excess for males at any ages, except in early childhood, although some excess mortality for males at most ages is the general experience. The percentage of excess at ages 25-34 years and 35-44 years was greater in the United States than in any of the other countries. At older ages, the excess of mortality for males in the United States

⁵ Data are from the STATISTICAL YEAR-BOOK of the League of Nations, 1936-1937.

⁶ Data taken from THE REGISTRAR GENERAL'S STATISTICAL REVIEW OF ENGLAND AND WALES, 1934. Part I.

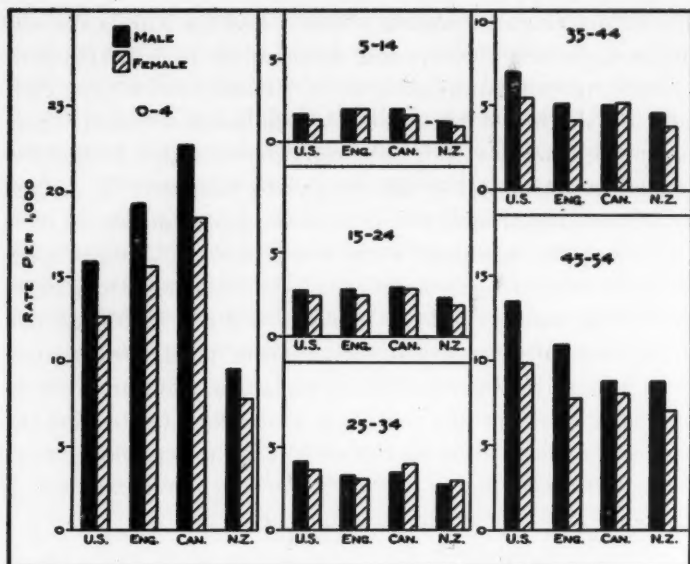


Fig. 6. Comparative mortality by sex and age up to 55 years of age in the United States (Registration States of 1920), 1933-1935, in England and Wales, 1934, in Canada, 1930-1932, and in New Zealand, 1930-1932.

was less than in England but greater than in Canada and New Zealand. Also at younger ages, between 5 and 24 years, the relative excess mortality for males in the United States was greater than in England and Canada but less than in New Zealand. In general, the males in the United States were at a greater disadvantage with respect to their chances of dying as compared with the chances of females dying than were males in these other countries. The relatively unfavorable situation in the United States at ages 25-44 years is especially important since these are ages at which death should be postponable and premature death of the breadwinner is a serious economic catastrophe.

The actual death rates at specific ages for each country, which are plotted in Figure 6 for ages up to 55 years, show that in middle life the mortality experience in the United States is less favorable

than in any of these countries. This is true for both males and females in the United States and, therefore, the high ratio of male to female mortality in this country is not associated with an especially low death rate for females. In childhood, the mortality in the United States is considerably lower than in either England or Canada, and in the age group 15-24 years, females in the United States have some advantage but males have approximately the same death rates. The lower childhood mortality in the United States offsets the effect of higher mortality at adult ages on the total death rates in this country and tends to obscure the real health problem which exists unless age-specific rates are considered. Greater attention is being given by health authorities to the adult health problem and it is evident that this is not a question of extending the benefits of modern medicine to the older age groups alone but of finding methods to protect the health of young adults, especially of postponing death for the males in the population.

EVALUATION OF A RURAL SCHOOL HEALTH EDUCATION PROJECT

II. A STUDY OF THE EFFECTIVENESS OF A RURAL SCHOOL HEALTH PROGRAM IN IMPROVING THE SCHOOL ENVIRONMENT¹

by C. A. GREENLEAF, M. D. AND RUTH E. GROUT²

A SAFE and healthful environment adjustable to the physical needs of pupils is essential in any school. Hygienic, comfortable surroundings not only provide a background for efficient and effective school work, but also are conducive to healthful living practices. It is the community's responsibility to make provision for an environment which will fulfill these requirements, and the teacher's responsibility to adjust the environment to individual needs.

The traditional red schoolhouse of the past around which much romance has been built was a place in which little provision was made for healthful living. Today, as never before, states are recognizing their responsibilities to children who will spend their early school life in these small schools. Many states are reorganizing schools into larger administrative units where changes can be effectively accomplished, but at the same time are increasing financial assistance to the smaller schools in order to equalize educational opportunities. They are recognizing the fact that many children will know no other school than the small one during the important early years of development. Federal figures show that despite the trend toward larger units in 1934 there were 162,953 small one and two-teacher schools still remaining in the United

¹ This is the second of a series of papers on evaluation studies which have been made of the school health program in Cattaraugus County through grants from the Milbank Memorial Fund. Appreciation is extended to Mr. Nelson M. Fuller, Sanitary Engineer, Cattaraugus County Department of Health, for assistance in analyzing material for this paper, and to Mr. Gilbert A. Farwell, District Superintendent, for help on state and local school policies.

² Respectively: Director of School Health Service and Director of School Health Study, Cattaraugus County.

States with an enrollment of approximately 4,635,147 children.³ In New York State alone, where centralization of schools is growing steadily, there were 6,719 one and two-teacher schools during 1933-1934.⁴

An important part of the school health program in the small rural schools of Cattaraugus County, New York, has been directing efforts toward the improvement of the school environment and its use. It is the purpose of this paper to study some of the changes that have taken place during a six-year period, 1931-1937, both from the standpoint of the factors that produced the changes and the results. This study for the most part is based on an analysis of information on the sanitation of buildings and health activities which is collected annually by the public health nurses during their spring check-up in the schools of the County (*see* Figure 1). Reports from 170 one and two-teacher schools will be used. These reports were selected from 234 reports in the school year 1931-1932, and from 203 reports in the school year 1936-1937, and represent schools from which complete reports were received for the two periods.

As a perspective to the present study a brief picture of rural schools previous to 1931 is revealing. Out of 157 schools from which sanitary reports were gathered in the school year 1929-1930, only twenty-five schools, or 15.9 per cent, had first aid kits; forty-three schools, or 27.4 per cent, served hot lunches; 123 schools, or 78.3 per cent, supplied soap; 100, or 63.7 per cent, provided toilet paper; and twelve, or 7.6 per cent, used paper cups. Conditions even more startling than these are described in the RURAL SCHOOL SURVEY OF NEW YORK STATE published in 1922.⁵ This survey showed common towels in use in 61.0 per cent of the schools studied; first aid

³ Cook, K. M.: REVIEW OF CONDITIONS AND DEVELOPMENTS IN EDUCATION IN RURAL AND OTHER SPARSELY SETTLED AREAS. Bulletin No. 2. Washington, D. C., Department of Interior, Office of Education, 1937.

⁴ These figures were obtained from the New York State Department of Education.

⁵ The Joint Committee on Rural Schools: RURAL SCHOOL SURVEY OF NEW YORK STATE. Ithaca, New York, 1922.

CATTARAUGUS COUNTY SCHOOL HEALTH SERVICE

Building and Sanitary Report and Health Activities

Supervisory District No. _____
 Town _____ School No. _____ Trustee _____ Address _____
 PRINCIPAL OR TEACHER _____ Enrollment _____

LIGHTING Number of windows on Front _____ Rear _____ Right _____ Left _____
 How many windows will open? _____ How many are screened? _____
SEATING Shades: Dark _____ Light _____ Single _____ Double _____ mounted _____ (circle correct answers)
 Seats: Single _____ Double _____ Adjustable _____ Movable _____ (circle correct answers)
 Are seats arranged for best light? _____ Are they in good condition? _____

ROOMS Smoky ceilings _____ Glossy blackboards _____ Draperies covering windows _____ (circle correct answers)
 Are walls painted or papered a light soft shade? _____ Do shade trees prevent proper light in room? _____ Are there artificial lights? _____ Kinds _____
 Kerosene _____ Gas _____ Electric _____ Semi-indirect electric _____ (circle correct answers)

TOILETS Flush _____ Privy _____ Chemical _____ Septic _____ (circle correct answer) Is odor from toilets noticeable in schoolroom? _____ Is toilet paper provided? _____ Is it in place? _____ Are toilet stools clean? _____ Are they cleaned regularly? _____

GROUNDS Free from litter _____ Adequate size _____ Well drained _____ (circle correct answers)
 Is there playground equipment? _____ If so, is it built sturdily? _____

HEATING AND VENTILATING Common stove _____ Jacketed heater _____ Other (specify) _____
 Is foul air accumulation evident upon entering room? _____
 Is there a cellar? _____ Is heater located in cellar? _____
 Has school a thermometer? _____ Are readings taken at desk height? _____

WATER SUPPLY Circle correct answers in all of the following:
 Spring _____ Dug well _____ Driven well _____ Bored well _____ Village _____
 If spring water is used, is it _____ Piped to school? _____ Carried in containers? _____
 If pump is used, is it _____ Hand? _____ Power? _____ Is drinking apparatus clean? _____
 Type of drinking apparatus: Pail _____ Tank or stone crock with faucet _____
 Tank with bubbler _____ Fountain _____ Individual cups _____ Paper cups _____

HAND WASHING Is handwashing equipment clean? _____ Is running water system of handwashing employed? _____ Is running hot water available? _____ Circle any of following that are present: Lavatory _____ Wash basin _____ Cake soap _____ Liquid soap _____
 Powdered soap _____ Is there a mirror? _____ Is it at height for pupils' use? _____
 Are individual towels used? _____ Are they paper towels? _____

REPAIRS NEEDED What are the outstanding needs in sanitation and equipment for health protection? _____

IMPROVEMENTS What improvements have been made in building, sanitation and playground equipment during past school year? _____

BOOKS List all health texts and supplementary readers: (use back if necessary) _____

FIRST AID Is there a first aid kit? _____ Adequately supplied? _____

HOT LUNCHES Was hot lunch served during the year? _____ If not, state reason _____
 If so, for how long _____ How many pupils had hot dish regularly while hot lunches were served? _____
 Method: Cooked at school _____ Hot jar _____ Thermos _____ (circle correct answer)

INSPECTION Do you have morning inspection? _____ Kind: Teacher _____ Selected pupils _____
 Each child his own _____ (circle correct answer)
 Have you a school club which includes health activities? _____

INSTRUCTION Is health instruction given regularly? _____ This should include correlations, health projects, and practices of healthful living throughout the school day. (specify) _____

WEIGHING Is there a scale in the school? _____ If not, do you use one in the neighborhood? _____ How often were pupils weighed? _____
 Were parents notified of weight? _____

Please note on back of this sheet ways in which the School Health Service can be of help to you in planning your program for next year.

Date Inspected _____ Public Health Nurse _____

Fig. 1.

kits in only 10 per cent; and lighting, heating, and sanitary conditions appallingly bad.

FACTORS INFLUENCING ENVIRONMENTAL CHANGES

The changes which have taken place since these earlier years can be attributed to several factors, perhaps the most important of which has been increased State aid. Beginning with the school year 1931-1932, public school monies from the State of New York have been apportioned and paid to each district employing one teacher at the rate of \$1,500 minus a sum of money equal to four mills for each dollar of actual valuation of the taxable property of the district. This is the maximum amount which any one-teacher school not contracting for the instruction of grade pupils may receive. In actual practice districts usually are not spending the full \$1,500, in which case the State aid is the difference between the amount of the expenses and the sum represented by four mills per dollar of actual property value. In 1930-1931 the maximum amount was \$1,400 with the same deductions and in 1929-1930, \$1,300.⁶ In 1928 and earlier the amount was very much less and was based on district valuation. This amount of State aid makes possible, through careful and intelligent planning, progressively better schools.

The actual bringing about of improvements depends upon the human factor. According to the State Education Law⁷ a district superintendent of schools has the power and is invested with the duty to "direct the trustees of any district to make any alterations or repairs to the schoolhouse or outbuildings which shall in his opinion be necessary for the health or comfort of the pupils." The five district superintendents of Cattaraugus County have accepted this responsibility and have done much to improve the schools through long-time planning with the trustees, of which there is one

⁶ ———: EDUCATION LAW. Albany, New York, The University of the State of New York, 1936. Section 491, No. 3.

⁷ ———: EDUCATION LAW. Albany, New York, The University of the State of New York, 1936. Section 395, No. 5.

for every one-teacher school. Persuasion and education, rather than coercion, have been the methods employed by the superintendents in working for improvements. They often have used the technical assistance of the Cattaraugus County School Health Service and the Cattaraugus County Department of Health, most especially the public health nurses and the sanitary engineer. They also have been aided by the teachers who through their daily contact with the local community and through their educational program frequently are able to stimulate a desire for improvements.⁸

An early activity of the school health education project, established in the County through grants from the Milbank Memorial Fund in the summer of 1931, was to enlist the help of committees of rural teachers in the preparation of a school inventory form. This inventory contains questions on the school environment and its use and has been instrumental in focusing attention of local groups on their needs. Provision is made for checking conditions twice a year over a three-year period, a plan which aids a teacher in watching progress year by year and helps a new teacher in surveying the needs as seen from her own point of view and that of her predecessor. Frequently the pupils help to take this inventory.

The sections of the inventory deal with sanitation; heating, ventilation, and lighting; room arrangement; cleanliness; safety; school lunch; weighing and measuring program; school program and health; individual health behavior at school and at home; and home environment. The schools are encouraged to select a few problems on which to work each year, and are given assistance in meeting these problems.⁹ Teachers are helped to see that the improvement of an environmental condition, such as the water supply, is not just a matter of physical change, but also an opportunity for vital educational experiences on the part of the pupils.

⁸ Grout, R. E.: *HANDBOOK OF HEALTH EDUCATION, A Guide for Teachers in Rural Schools*. New York, New York, Doubleday, Doran and Company, Inc., 1936.

Grout, R. E.: *A Project in Rural School Health Education*. Reprinted from *The Milbank Memorial Fund Quarterly Bulletin*, July, 1933, xi, No. 3, and from the *Quarterly*, April and October 1934, xii, No. 2 and 4; January and April, 1935, xiii, No. 1 and 2.

The building and sanitary reports and the reports on health activities referred to previously are tabulated in the office of the school health service. The findings are summarized yearly, and the results are made known from time to time to those working in rural schools. Each year, in addition to the attention given by nurses and teachers to local problems, special emphasis may be placed on some county-wide condition which needs improvement, such as first aid kits, screens, or lighting. County-wide campaigns for one particular problem to the exclusion of all others, whether it be one connected with the school environment or with some other phase of school health, have been avoided.

In view of these favorable conditions for making the school environment both healthful and comfortable one might expect to find ideal situations in the 190 small rural schools still open in Cattaraugus County. Perhaps such would be the case if energies of all concerned had been concentrated on these problems only. This obviously is an impossibility. However, it is anticipated that this study will help to renew efforts to make needed changes through directing attention once more to weaknesses, and pointing to accomplishments which have been made possible as a result of concerted action.

CHANGES IN THE SCHOOL ENVIRONMENT AND ITS USE

Some difficulty was experienced in summarizing the building and sanitary reports and reports of health activities from which the following figures for the most part were obtained. It has been necessary to omit a number of items entirely on account of the ambiguity of the answers. A few questions were changed during the six-year period, thus changing the meaning of the answers. In general only those questions which give evidence of being answered adequately and consistently both in the spring of 1932 and the spring of 1937 will be used. Sources of information other than the above will be explained as they are brought into the summaries.

Water Supplies, Drinking, and Cleanliness Facilities. The small

rural school ordinarily depends upon a spring or well water supply. A well preferably should be located in the school building or on the school grounds. Spring water may be piped from a neighboring hillside. In an ideal situation both running hot and cold water are provided. In practice these are not found in most rural schools at the present time. Equipment for both cleanliness and drinking which is reasonably satisfactory from a sanitary point of view is required within the financial limitations of the school.

Information obtained from the sanitary reports is incomplete in respect to the sources of water supplies in Cattaraugus County, but reports from the public health nurses made at the time they collected samples of water for laboratory examination in the spring of 1937 give a fair picture of conditions at that time. One hundred and forty-four of the 170 schools have their own supply while sixteen schools obtain water from private supplies. (Reports from ten schools are uncertain.) One hundred and eight of the school supplies are from driven or drilled wells, three from dug wells, twenty-three are from springs, and two from municipal supplies. (Reports from eight schools are uncertain).

Regular bacteriological examination of all rural school water supplies twice a year was begun in the fall of 1936 at the instigation of the County Department of Health. 22.3 per cent of the supplies on which single samples were obtained were unsatisfactory. Until a more adequate system of follow-up can be provided for retesting and for making sanitary surveys at the sources of the supplies these figures cannot be considered conclusive.⁹

⁹ The problem is made more complex by the fact that many samples of water are obtained from driven wells equipped with pitcher pumps. Since samples of water collected from such pumps are apt to be contaminated it is difficult to interpret these laboratory findings. In the case of spring supplies, previous work carried on in the County has shown that springs located in the most inaccessible spots, and therefore unquestionably free from any human pollution, show evidence of colon organisms in sufficient numbers to indicate an unsatisfactory water for domestic consumption. This may be due to salamanders which inhabit the shale formations from which springs are ordinarily developed in this County. See: Hassler, W. G.: Salamanders and Water Hygiene. New York, New York, American Museum of Natural History. Reprinted from *Natural History*, 1932, xxxii, No. 3, pp. 303-310.

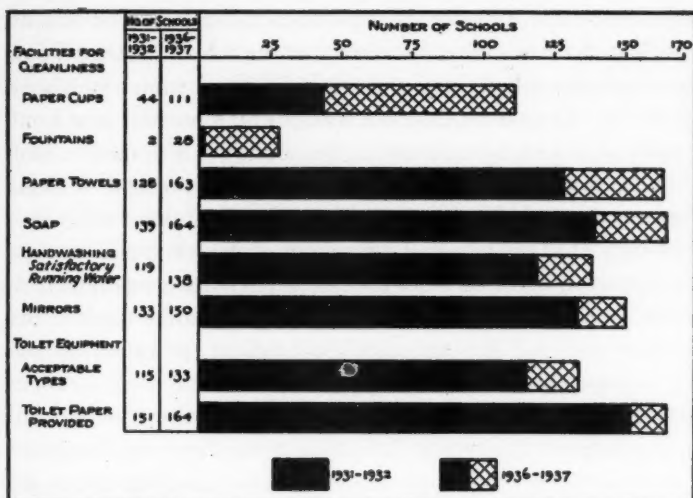


Fig. 2. Comparison of cleanliness facilities and toilet equipment in 170 rural schools in Cattaraugus County in the spring of 1931-1932 and 1936-1937.

Types of drinking apparatus have shown considerable improvement in the 170 schools during the six-year period (*see* Figure 2). Schools with paper cups have increased from forty-four to 111, and those with fountains from a running water supply have increased from two to twenty-eight. Every school reports the use of individual cups in 1937 while in the fall of 1931 ten of the 170 did not have them. In 1937, reports for 136 schools indicate that 62.5 per cent of the schools were supplied with water coolers, stone or metal containers with faucets, for dispensing water. 9.6 per cent of the schools still take their drinking water from a pail.

In this northern climate it seems desirable to have equipment for both drinking and handwashing within the school building. Many schools have added small rooms to their buildings in which are located well or spring water taps together with lavatory equipment. Others have built additions for toilet and lavatory.

Types of handwashing equipment will vary according to the

source of the water supply. In some schools hands may be washed directly under the pump. However, lavatories have increased during the six-year period from 46.2 per cent to 72.7 per cent (the latter is based on 154 reports). The old wash basin, so often a menace to cleanliness, has decreased in about the same ratio as lavatories have increased. Soap is now found in practically every school, whereas in 1932 only 139 of the 170 schools reported a soap supply (*see* Figure 2). The water cooler when placed on a shelf over a lavatory provides an efficient arrangement for a running water system of handwashing. In 1937, 138 schools reported washing hands under running water and in 1932, 119 schools reported a "clean, satisfactory arrangement of handwashing."

Mirrors placed at a level for children's use are helpful in stimulating neatness of appearance. Schools with mirrors have increased from 133 to 150 in the six-year period. With a little effort there is no reason why every school should not have at least one mirror.

Paper towels have become almost universal. In 1937 only five schools reported no paper towels as against forty in 1932 (*see* Figure 2). All of these five schools reported the use of individual towels in 1937. This is a far cry from the common towel in 61 per cent of the schools surveyed by the State fourteen years ago.

Toilet Equipment. Acceptable types of toilets for rural schools, provided they are of the correct design, properly installed, in good repair, and suitably maintained, are septic closets, which may or may not be connected with a flush system, and chemical toilets. The privy is not considered acceptable in Cattaraugus County where climatic conditions in winter make it undesirable and where funds are available for better types of toilets. However, in some supervisory districts no great effort is made to substitute a better type in schools which probably will be closed permanently in a short time, especially if the registration in these schools is small.

Between 1930 and 1932 the schools were very active in installing improved types of toilets. Among the 170 schools there were fifty-

five privies left in the spring of 1932. By 1937, privies were reported in thirty schools and the type of toilet was uncertain for seven other schools. A study of school registrations for the year 1936-1937 shows that twenty-three of these thirty schools had fewer than ten children. Acceptable types of toilets increased in proportion to the decrease in privies.

At the time of the last survey a number of toilets appeared to need attention. Odor was noticeable in the schoolroom from one of the chemical types and sixteen of those with septic tanks. Ten out of these sixteen schools are in one supervisory district where a number of poor installations were made prior to 1930. One hundred and forty-six of the 170 toilets were reported by the nurse as clean in 1932, and 152 as clean in 1937. Toilet paper was lacking in eighteen schools in 1932 and four schools in 1937 (reports from two additional schools were uncertain).

Heating and Ventilation. One of the most unsatisfactory conditions in rural schools is that of heating and ventilation. From December 1926 to May 1929 the New York State Commission on Ventilation made a detailed study of rural school ventilation in Cattaraugus County "with reference to heating conditions in the classroom and the incidence of respiratory illness."¹⁰ The Commission reported:

Conditions of general overheating in the classrooms, and very poor lateral distribution of temperature and cold floors were found. Overheating was most noticeable in the case of rooms heated by the so-called jacketed stove and least so in rooms heated by ordinary unjacketed stoves. The furnace heated rooms were intermediate in this respect. Distribution of temperature was most even in the case of furnace heated rooms and least so in the rooms with ordinary stoves. Twenty-five per cent of the observations among the latter showed differences in excess of thirteen degrees when the seasonal average temperatures at various desks about the room were compared. Fifty-five per cent of the observa-

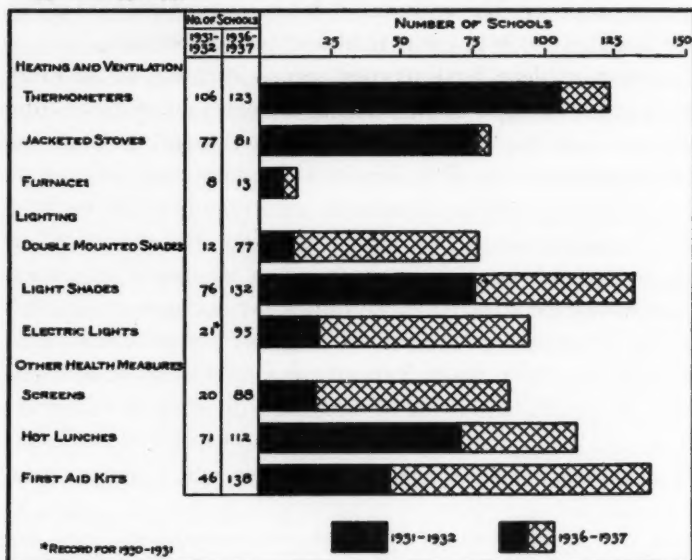
¹⁰ Cole, R.; Kimball, D. D.; Lee, F. S.; Palmer, G. T.; Phelps, E. B.; Thorndike, E. L.; Winslow, C.-E. A.: *A Study of Rural School Ventilation in Cattaraugus County, New York*. Reprinted from *The American Journal of Hygiene*, July, 1931, xiv, No. 1, pp. 49-78.

tions on these same rooms disclosed floor temperatures below sixty degrees. . . . One local factor which apparently influences such minor illnesses (respiratory illnesses) appears to be overheating or overchilling of the schoolroom.

The one-room school seems poorly adapted to any ordinary system of heating. Some improvement is indicated where cellars have been built. These cellars hold the furnace and in addition provide added space for play and for work shops. In the six-year period there has been little change in heating systems as shown in Figure 3. Although a number of new installations of jacketed heaters have been made, in several instances it is known that the jackets have been removed.

Thermometers are provided, are broken and then are replaced. Seventeen more schools had thermometers in 1937 than in 1932, but

Fig. 3. Comparison of the heating and lighting facilities and miscellaneous health measures provided in the rural schools of Cattaraugus County in the spring of 1931-1932 and 1936-1937.



nearly fifty schools still are without them (*see* Figure 3). At the county-wide teachers' conference in the fall of 1936 special emphasis was placed on the use of thermometers. There seems little excuse for every school not having a thing so essential as well as so inexpensive. At these same meetings suggestions were given for taking thermometer readings at desk height. It is gratifying to note that 101 of the 123 schools with thermometers employ that method of taking the temperature.

Lighting and Seating. Standards for classroom lighting are the same for all schools whether single one-room schools, or larger schools with several classrooms. Essentials for a well-lighted classroom are too numerous to outline here, but among them are light walls and ceilings; window area one-fifth the floor area; light-colored, double-mounted shades (that is two shades mounted on two rollers attached at the middle of the window, one shade operating downward and the other upward); and artificial lights of adequate intensity. The omission of other requirements from the above list does not in any way minimize their importance.¹¹

Lighting problems have received special attention in the rural schools of Cattaraugus County during the past four years. Groups working for better classroom lighting have found their efforts made easier as a result of the county-wide educational program of the local Farm and Home Extension Service, and the far-reaching rural electrification program of the Federal government which has brought electricity for the first time to many isolated communities.

Among the special activities to promote better classroom lighting have been: special lighting surveys of poorly lighted schools conducted by the local power company and the district superintendents; the use of a light meter by the health education consultant on her visits to schools; a County Fair exhibit consisting of an almost full sized model of a well-lighted schoolroom which all the school

¹¹ Smith, M. E.: *A PROGRAM OF EYE HEALTH IN A SCHOOL SYSTEM*. New York, New York, National Society for the Prevention of Blindness, Inc., 1935. Publication 143.

trustees were invited to inspect; and special units of work on lighting developed by teachers and pupils. Although a complete picture of the changes that have occurred in the six-year period is not available, certain improvements are evident. (See Figure 3.) Light-colored shades are found in 82.5 per cent of the schools in 1937 as against 49 per cent of the schools in 1932 (based on 154 reports). Schools with double-mounted shades have increased in the same period from 7.1 per cent to 45.3 per cent. Ninety-five of the 170 schools reported electric lights in the spring of 1937, a contrast to the twenty-one schools having them in 1930-1931 (reports for 1931-1932 are too incomplete to use). There is much education necessary, however, before schools will install lighting units of sufficient intensity to meet the standards for good schoolroom lighting.

Light walls were reported in 152 of the schools in 1937. Information on this point is lacking for the earlier period, as is also information on structural changes, such as increased window area, for both periods. It is known, however, that a number of the schools have been remodeled to provide for increased window area. Possibly the fact that the knowledge of some of these conditions is incomplete, especially for the earlier period, is in itself indicative of the progress that has taken place in attention to lighting problems.

In the spring of 1933, at the instigation of the school health education office, a lighting survey was made of thirty-one small schools which presented unusual lighting problems. This was done by the local power company assisted by the district superintendents and the sanitary engineer of the County Department of Health. Following the survey, educational materials were left with the teachers who were encouraged to help the pupils make a special study of the problems found. Table 1 shows the changes that have occurred in these schools during a five-year period. The figures are complete for twenty-seven of the thirty-one schools. The remaining four have closed, and the pupils have been transferred to larger schools where lighting conditions presumably are better.

| | NUMBER | | PER CENT | |
|--------------------------|----------|------|----------|------|
| | 1933 | 1937 | 1933 | 1937 |
| Walls A Light Soft Shade | No Info. | 25 | No Info. | 92.6 |
| Double-Mounted Shades | 2 | 17 | 7.4 | 63.0 |
| Light-Colored Shades | 2 | 23 | 7.4 | 85.1 |
| Electric Lights | 13 | 22 | 48.1 | 81.5 |
| No Shades | No Info. | 1 | No Info. | 3.7 |

Table 1. Lighting conditions in twenty-seven schools taken from surveys in 1933 and 1937.

Seating, which has a direct bearing on the amount and quality of light that a pupil receives, has been given special attention, also. The figures for types of seats are very incomplete for both periods, but an increasingly large number of schools are purchasing movable seats, or tables and chairs each year. The unadjustable, unmovable seats are fast disappearing.

Hot Lunches. One evidence of a teacher's interest in the welfare of her pupils, as well as of the degree of home-school cooperation which exists in a community, is the presence or absence of a hot lunch plan. The school health education program each year places emphasis on the value of a warm dish for a part of the noon meal at school and gives teachers assistance in making plans. The public health nurses also have given much help in promoting school and community interest in hot lunches.

Several methods for serving the lunch are employed, each school being encouraged to work out its own plan. In 1932 there were seventy-one schools out of 170 serving hot lunches at noon, while in 1937 the number had increased to 112. (See Figure 3.) An analysis of the methods used in 1936-1937 shows that in fifty-two the lunch was cooked at school; in forty-six, the hot jar method was used; in ten, lunch was brought in thermos bottles; in one, the meal was cooked at a neighbor's; and for three schools the information was lacking. A majority of the schools serve hot lunches from fall to spring, or longer. In 1937 only seven schools reported serving

lunches for two months or less. Among the fifty-eight schools reporting no hot lunches in 1936-1937 the reasons stated for not doing, so were: children or parents not interested, thirteen; no equipment for heating lunches, twenty-three; children go home, nineteen; other reasons, three.

Weighing Program. For a number of years the public health nurses have carried portable scales to the small schools for an annual weighing. In addition, some schools have arranged to use neighborhood scales for more frequent weighing. In 1936-1937 only eleven of the 170 schools reported scales of their own, while twenty-eight reported using neighborhood scales. In the same year only fifteen schools were weighing pupils monthly. This unsatisfactory state of affairs has led to a drive for more scales in the schools in order that frequent weighing, with emphasis on steady growth, may be accomplished. A large number of schools are purchasing scales during the present school year. In some schools there has been difficulty with the accuracy of the scales, especially where cheap ones were purchased, but even in these schools teachers report a great interest on the part of the children in improving their health habits for better growth.

Screened Windows. In the program for bettering the school environment little emphasis has been placed until recently on equipping schools with screens. In 1931-1932 only twenty of the 170 schools reported having screens. The number had increased to eighty-eight by 1936-1937, but the condition remains far from ideal (see Figure 3). One can easily see why extensive building changes are hard to finance, but it is difficult to understand the slowness with which school districts have equipped their school buildings with screens. Screens are within the budget of any district and important for the comfort of children as well as the cleanliness of the interiors.

First Aid Kits. A well equipped first aid kit is an essential in any school. An inexpensive home-made kit stocked with supplies pur-

chased with the school's needs in mind is as satisfactory as an expensive, commercially-made kit. The number of schools with kits has increased from forty-six to 138 during the period from 1931-1932 to 1936-1937 (see Figure 3). In addition it is felt that many schools have the benefit of kits furnished by individual teachers, but not reported as possessions of the schools.

Continual educational effort has had its effect on the increase in kits. For the past two years letters have gone out from the school health education office to teachers in schools lacking kits. These letters have suggested ways of making kits and have contained educational materials which the teachers might use while working on the problem of safety and first aid.

Textbooks. The health textbook as a reference book for the pupil is an important aid to good health teaching. Schools in Cattaraugus County have been encouraged to add to their libraries at least one set of up-to-date pupil health books. In addition many schools avail themselves of the books on loan from the school health education office. A more or less arbitrary classification of the schools according to the adequacy of their supply of health books is as follows: very good, 13.1 per cent; good, 13.1 per cent; fair, 50 per cent; poor, 19.7 per cent; none, 4.1 per cent. In few schools could one rate the supply as excellent.

Improvements in General. During the six-year period covered in this study yearly environmental improvements have been made, on the average, in 60.7 per cent of the schools. It is worthy of note that the greatest number of improvements occurred in the year (1934-1935) that special emphasis was given for the first time in the teaching program to problems of the environment.

Although \$250¹² annually (\$50 by trustee and \$200 at direction of superintendent) may be spent for improvements in building and equipment in excess of the amount which the district votes to spend,

¹² ———: EDUCATION LAW. Albany, New York, The University of the State of New York, 1936. Section 275, No. 14 and Section 395, No. 5.

the sum available for improvements each year is not enough for extensive alterations. If radical changes, such as constructing a cellar, or remodeling the building are made money must be borrowed for the purpose. This is being done in some districts, but others are reluctant to become involved with debts when the future is uncertain. Nevertheless, there still are many needed improvements which could be made within the yearly financial limitations.

In the six-year period forty-two of the small schools have closed and now are transporting their pupils to large central schools, or in a few instances, to a neighboring village school which is not centralized. Three new central schools and one new village school have been built in this time, and three other village schools have been remodeled and enlarged. Since the large schools on the whole provide better environmental conditions, these shifts may well be considered steps in advance.

Beneficial effects from environmental improvements in the small school may extend beyond the school itself. A new well, a new septic toilet, or some other improvement in a school often is followed by similar changes in homes of the neighborhood. Community pride is aroused when a building is well equipped and in good condition. Then, too, a school with conveniences is more likely to become a center for community social activities.

Since the small rural school provides a home for school children during half their waking hours, and since it also has potentialities for raising living standards of the community at large, efforts should be continued toward making it healthful and safe.

DIFFERENTIAL FERTILITY IN THE EAST NORTH CENTRAL STATES¹

A PRELIMINARY ANALYSIS OF UNPUBLISHED TABULATIONS
FROM THE FAMILY CARDS OF THE 1930 CENSUS

by FRANK W. NOTESTEIN

THE 1930 census gave promise of securing data on the fertility of marriage for the first time since 1910. At the censuses of 1890, 1900, and 1910 each married woman was asked the number of children she had borne but the answers, collected at considerable expense, were never presented in the census tabulations. It was not surprising, therefore, that the entire series of questions relating to fertility was dropped in 1920. As plans for the 1930 census developed it became evident that the newly designed family card would afford an opportunity to secure data on effective fertility at relatively small expense.

The data available on the family card were less satisfactory than those previously collected, because they related not to the total births but to the number of children under age 10 living in the census family. Obviously such information was far from ideal, but it had the advantage of simplicity. Only one new question was required on the schedule, that relating to age at marriage, and the tabulations needed were not particularly involved. In the light of the past experience it was entirely reasonable to prefer inadequate but useful data that could be tabulated to adequate data that had little chance of meeting the light of day.

The sixth count of the family card was accordingly designed. It dealt with unbroken families in which neither husband nor wife had been married more than once. For this group, classified by residence, color-nativity, and value of home, it gave the number of

¹ From the School of Public Affairs, Princeton University. This paper, substantially in its present form, was presented to the Division on Social Biology of the American Sociological Society on December 29, 1937.

children under age 10 living at home by single years of wife's age at marriage and at the census, hence also by single years of duration of marriage. The plans laid, history repeated itself. There were unexpectedly heavy drains on the budget and money ran out when the count had been completed for only the East North Central Division. The tabulation was not published.

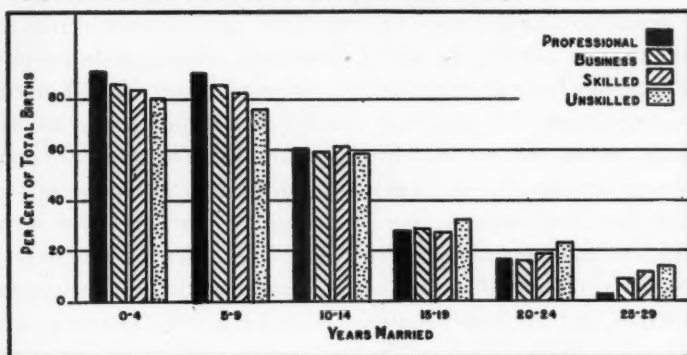
Through the cooperation of Director Austin and Dr. Truesdell, the consolidation sheets for this division have been made available to the School of Public Affairs for analysis and publication. The present study is a progress report on that analysis. It has a dual purpose. First, it aims to summarize the more important information yielded concerning fertility differentials. Second, in view of the imminence of planning for the 1940 census, it aims at a critical examination of the limitations and usefulness of this type of data as a substitute for those relating to actual births. To accomplish this dual purpose, it will be necessary to present the provisional results within the framework of a somewhat methodological report.

Before passing to a consideration of the 1930 material, it may be well to point out that the earlier census data relating to the fertility of marriage had two characteristics of great theoretical and practical importance. The first was that the data related not to annual births but to total births. This made it possible to study not only average fertility, but the distribution of fertility in any group; to determine, for example, the proportion of marriages that were childless and the proportion that were highly fertile. The second characteristic was that the data appeared on the regular census schedule and, therefore, could be related family by family to any other item on the schedule. This fact made possible a direct study of the relation of fertility to such attributes as occupation of the husband and color-nativity, and solved all problems of residence allocation.

The 1930 substitute for data on total fertility has the advantages of the second sort. The data collected can be associated directly with

any item on the family card. Its weakness lies in the fact that it deals not with total births, nor in fact with births at all, but with the number of children under age 10 living at home. The number of children under age 10 is less than the total births by the number of those who have died, of those who are over 10 years of age, and of those who are under 10 but living away from home. There is no way of estimating the aggregate differences accurately, but reference to a sample of the 1900 census data will serve to indicate their general nature. The 1900 sample was drawn from the census returns for native-white couples in the East North Central States.² In anticipation of the 1930 family card, the data obtained included children under 10 at home as well as the total number of children born to the wife. Figure 1 gives for this sample the percentage that children under 10 formed of total births, for married women classified by

Fig. 1. Children under age 10 living at home as percentage of total children born in urban families classified by occupation of husband and duration of marriage: 1900. (The data are from a sample of the 1900 census schedules for the native white population of selected cities in the East North Central States.)



² The data were secured by the President's Research Committee on Social Trends in cooperation with the Milbank Memorial Fund. For further description of the sample and analysis of the data see:

Kiser, Clyde V.: Fertility of Social Classes in Various Types of Communities of the East North Central States in 1900. *Journal of the American Statistical Association*, December, 1932, xxvii, 180, pp. 371-382.

Kiser, Clyde V.: Trends in the Fertility of Social Classes from 1900 to 1910. *Human Biology*, May, 1933, v, No. 2, pp. 256-273.

occupation of the husband in each five-year duration of marriage group.

The figure brings out three facts of importance in the interpretation of the 1930 data. First, children under 10 represented rapidly decreasing proportions of the total births after the tenth year of married life, because of the increasing number of children who had passed their tenth year. To avoid the difficulties of attempting to take account of unknown proportions of children over age 10, the analysis of the 1930 material had to be limited to marriages of less than ten years' duration. In the present report it is further limited to those of five to nine years' duration.

The second point worthy of note is that among marriages of five to nine years' duration children under 10 represented a larger proportion of total births in the upper than in the lower occupational classes. The difference was due to the higher rates of child survival in the upper classes. This differential was much more important in 1900 than in 1930. Life tables for males in Michigan showed only 83 per cent of those born surviving to the tenth year in 1901, compared with 91 per cent in 1930.³ During the interval class differences also have narrowed. Nevertheless, they still exist to some extent. The number of living children will differ most from the number of births in the classes with the highest child mortality.

Third, class differences in the ratio of children to births disappeared by duration group 10-14 and reversed thereafter. The reversal can be due only to the fact that class differences in survival were more than canceled by increased differences in fertility. In other words the relative differences in the fertility of the classes increased substantially after the first ten years of married life. The differences observed for marriages of 5-9 years' duration in 1930 must not, therefore, be confused with those for completed families.

³ Glover, James G.: *United States Life Tables 1890, 1901, 1910, and 1901-1910*. Washington, D. C., Government Printing Office, 1921, p. 144.

National Resources Committee: *Population Statistics, 2. State Data*. Washington, D. C., United States Government Printing Office, October, 1937, p. 39. (White population only.)

Figure 2 illustrates the effect of differences in survival on the relative class differences in the number of children per wife in 1900. In it the mean number of children under age 10 and the mean number of births per wife in each occupational class are expressed

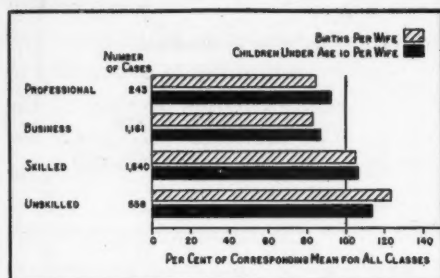


Fig. 2. Relative differentials in fertility of urban occupational classes as measured by mean number of children born and as approximated by mean number of children under 10 per wife for marriages of five to nine years' duration: 1900. (The means for each class are expressed as percentages of the corresponding mean for all classes. Source of the data is the same as in Fig. 1.)

as percentages of the corresponding mean for all classes combined. It is apparent that the average numbers of living children under-estimated the true differences in fertility. However, they did show the true order of the classes with respect to fertility. Since the mortality selection was much less severe in 1930 than in 1900, comparisons of the average

number of children living in 1930 should yield reasonably accurate estimates of relative differences in fertility.

Figure 3 further illustrates the importance of remembering that class differences in fertility during the first ten years of married life are not the same as those at the end of the childbearing period. The figure, which is based on a sample drawn from the census of 1910,⁴ compares the mean numbers of children born per wife for two groups; one comprises wives married five to nine years, the other, wives 40 to 44 years of age. Within each of these groups, the mean for each occupational class is expressed as a percentage of that for all occupations combined. The greater spread of the means

⁴ For a description of this sample see:

Sydenstricker, Edgar and Notestein, Frank W.: Differential Fertility According to Social Class. *Journal of the American Statistical Association*, March, 1930, xxv, No. 169, pp. 9-32.

for women of virtually completed fertility than for those married five to nine years is evident. In this case, moreover, even the order of the business and professional classes differed.

Two further limitations of the 1930 data should be mentioned. First, the children counted included not simply children of the married couple but any related or connected child in the home. Since the families under consideration had been established less than ten years by persons who had not been married before, the number of children of other marriages in their homes was probably small. The second limitation is more important. The material presented in this report relates only to those families in which the husband was the head of the house and the wife the home-maker. This limitation excludes, for example, couples otherwise qualifying who were living in the homes of their parents. Such secondary families are characteristically small and include large proportions of childless couples. Because of their exclusion, the average numbers of children presented in this report are somewhat too high. The bias is smallest for the foreign-born white, and largest for the Negroes. In each color-nativity group, it is largest for the rural-farm population, but within urban communities it increases with size of community. In the final report it may be possible to take the secondary families into consideration.

With these qualifications in mind, we can proceed to a discussion of the data for 1930 presented in Figure 4 and the top panel

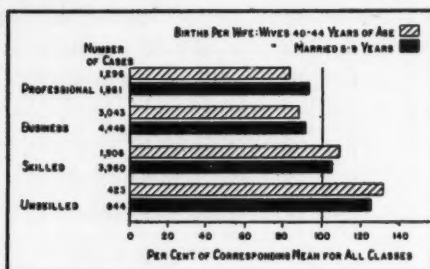


Fig. 3. Relative differentials in fertility of urban occupational classes for marriages of virtually completed fertility and for those of five to nine years' duration: 1910. (The average number of births per wife in each class is expressed as a percentage of the corresponding mean for all classes. The data are from a sample of the 1910 census schedules for the native white population of selected Northern cities.)

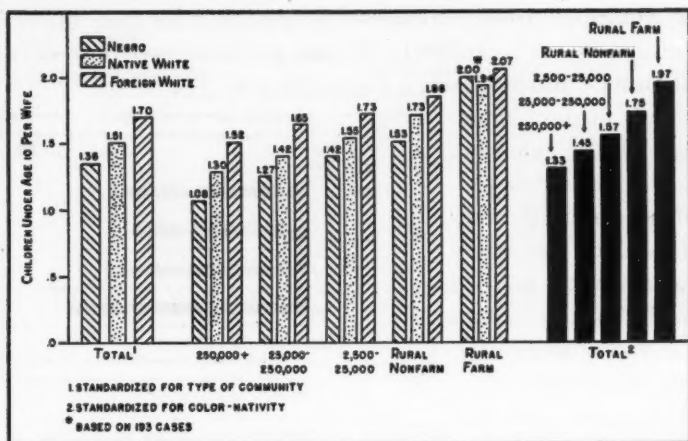


Fig. 4. Relation of color-nativity and type of community to the mean number of children under age 10 per wife for marriages of five to nine years' duration: East North Central States, 1930.

of Table 1. (The data from which the ratios presented in Table 1 were obtained are given in Table 2.) The table and chart show the average number of children under age 10 per wife for three color-nativity classes in five types of communities. Three points should be noted. First, the means for each color-nativity class without exception rose progressively from large cities to small and from urban communities to the rural-nonfarm and rural-farm groups. This rise was largest for Negroes, intermediate for native whites, and smallest for foreign-born whites. The bars at the right of the chart summarize the trends by presenting means for all color-nativity classes combined. The mean for small urban communities was 31 per cent higher, and that for the rural-farm group was 48 per cent higher than the mean for large cities. If secondary families had been included the differences, with one exception, probably would have been even larger. The difference between the rural-nonfarm and the rural-farm groups would have been reduced by the large proportion of secondary families in the farm population. In general,

| TYPE OF COMMUNITY | TOTAL (Standardized ¹) | NEGRO | WHITE | |
|--------------------------------------|---------------------------------------|-------|-------------------|--------------|
| | | | Native | Foreign-Born |
| | | | CHILDREN PER WIFE | |
| TOTAL (Standardized ¹) | 1.54 | 1.36 | 1.51 | 1.70 |
| 250,000+ | 1.33 | 1.08 | 1.30 | 1.52 |
| 25,000—250,000 | 1.45 | 1.27 | 1.42 | 1.65 |
| 2,500— 25,000 | 1.57 | 1.42 | 1.55 | 1.73 |
| Rural Nonfarm | 1.75 | 1.53 | 1.73 | 1.86 |
| Rural Farm | 1.97 | 2.00 | 1.94 | 2.07 |
| CHILDREN PER "MOTHER" | | | | |
| TOTAL (Standardized ¹) | 1.98 | 2.45 | 1.95 | 2.07 |
| 250,000+ | 1.83 | 2.28 | 1.80 | 1.91 |
| 25,000—250,000 | 1.91 | 2.33 | 1.88 | 2.02 |
| 2,500— 25,000 | 1.98 | 2.46 | 1.95 | 2.08 |
| Rural Nonfarm | 2.12 | 2.57 | 2.10 | 2.20 |
| Rural Farm | 2.30 | 2.80 | 2.27 | 2.42 |
| PERCENTAGE OF HOMES WITH NO CHILDREN | | | | |
| TOTAL (Standardized ¹) | 22.5 | 44.7 | 22.7 | 18.0 |
| 250,000+ | 27.6 | 52.5 | 28.0 | 20.5 |
| 25,000—250,000 | 24.1 | 45.8 | 24.3 | 18.6 |
| 2,500— 25,000 | 20.6 | 42.2 | 20.4 | 17.0 |
| Rural Nonfarm | 17.8 | 40.5 | 17.4 | 15.5 |
| Rural Farm | 14.7 | 28.5 | 14.1 | 14.4 |

¹ The standardized average numbers of children per wife and percentages of homes with no children were obtained as follows:

(1) The specific ratios for each color-nativity group were applied to the distribution of wives by type of community in the entire sample.

(2) The specific ratios for each type-of-community group were applied to the color-nativity distribution of the entire sample.

The standardized average numbers of children per "mother" (M_t) were obtained directly from the other two standardized ratios from the relation $M_t = \frac{W_t}{1 - K_t}$ where W_t is the corresponding standardized average number of children per wife and K_t the corresponding standardized percentage of homes with no children. The resulting standardized average numbers of children per "mother" differ inconsequentially from those that are obtained by using the appropriate distributions of "mother" as the standards.

Table 1. Average number of children under age 10 living at home per wife, and per "mother," and percentage of homes with no children, for marriages of five to nine years' duration classified by color-nativity and type of community: East North Central States, 1930.

| TYPE OF COMMUNITY | TOTAL | NEGRO | WHITE | |
|--------------------------------------|-----------|--------|---------|--------------|
| | | | Native | Foreign-Born |
| WIVES MARRIED 5-9 YEARS | | | | |
| TOTAL | 687,732 | 22,334 | 556,336 | 109,062 |
| 250,000+ | 244,434 | 15,239 | 163,070 | 66,125 |
| 25,000-250,000 | 141,014 | 4,319 | 116,519 | 20,176 |
| 2,500-25,000 | 111,963 | 1,591 | 98,934 | 11,438 |
| Rural Nonfarm | 106,464 | 992 | 97,790 | 7,682 |
| Rural Farm | 83,857 | 193 | 80,023 | 3,641 |
| HOMES WITH NO CHILDREN | | | | |
| TOTAL | 154,572 | 11,107 | 122,486 | 20,979 |
| 250,000+ | 67,182 | 8,001 | 45,605 | 13,576 |
| 25,000-250,000 | 34,071 | 1,977 | 28,346 | 3,748 |
| 2,500-25,000 | 22,823 | 672 | 20,212 | 1,939 |
| Rural Nonfarm | 18,594 | 402 | 17,002 | 1,190 |
| Rural Farm | 11,902 | 55 | 11,321 | 526 |
| CHILDREN UNDER AGE 10 LIVING AT HOME | | | | |
| TOTAL | 1,056,422 | 26,102 | 855,126 | 175,194 |
| 250,000+ | 328,467 | 16,475 | 211,614 | 100,378 |
| 25,000-250,000 | 204,045 | 5,467 | 165,353 | 33,225 |
| 2,500-25,000 | 175,193 | 2,259 | 153,160 | 19,774 |
| Rural Nonfarm | 185,182 | 1,515 | 169,395 | 14,272 |
| Rural Farm | 163,535 | 386 | 155,604 | 7,545 |

¹ The data relate to unbroken marriages in which:

- (1) Neither the husband nor the wife had been married more than once.
- (2) The wife was the home-maker.
- (3) The husband was under 61 and the wife under 51 years of age and contracted her marriage between the ages of 15 and 40.

Table 2. Number of wives, number of homes with no children under age 10, and number of children under age 10 living at home for couples married five to nine years, classified by color-nativity of the household head and type of community: East North Central States, 1930.¹ (Data from which the ratios given in Table 1 are derived.)

however, the relationships shown reflect primarily true differences in fertility during the period 1920 to 1930.

Second, in each type of community, with one exception, the means were lowest for the Negroes, intermediate for native whites,

and highest for foreign-born whites. The exception was the Negro farm group for which the sample was too small to yield a reliable average. The bars at the left of the chart summarize the color-nativity differentials for all types of communities combined. The means for the native whites were 11 per cent higher and those for the foreign-born whites 25 per cent higher than the average for the Negro group. In the case of Negroes the low means were accounted for in part by low survival rates, but had the large proportion of secondary families been included the means would have been even lower. In the foreign-born white families low survival rates and low proportions of secondary families both contributed to a reduction of the means. Actual fertility data would have shown larger excesses over the native population than the present data indicate.

Third, although with one exception the color-nativity differentials took the same order in each type of community they were largest in the large cities and decreased rapidly with declining size of community. They were smallest of all in the rural-farm population. There the mean for Negroes, based on only 193 cases, did not differ from the means for the other two groups.

The relations just discussed have been shown from other types of data. They appear, for example, in the ratios of children under age 5 to women of childbearing age computed by Thompson and Whelpton.⁵ The data presented in Figure 5 and the second panel of Table 1, however, are unique and to some extent surprising. They give the mean number of children not per wife but per "mother," or, more precisely per wife in whose home there was at least one child under age 10.

The inverse relation between fertility and size of community noted before holds without exception. But the shift in the relation

⁵ National Resources Committee: *Population Statistics*, 1. National Data. Washington, D. C., United States Government Printing Office, 1937, Table 13, pp. 40-50.

In the East North Central States the ratios of children to women for Negroes were lower than those for native whites only in cities with 100,000 or more inhabitants and in the rural nonfarm population. It must be remembered that the averages given in the present study relate only to a defined group of unbroken marriages contracted between 1920 and 1925.

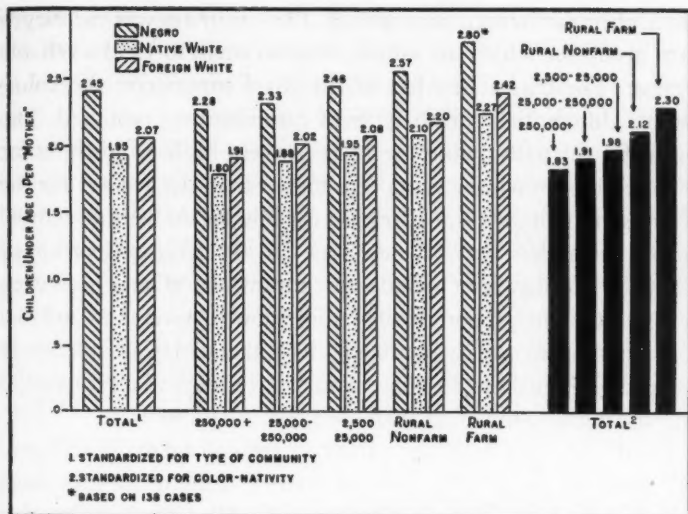


Fig. 5. Relation of color-nativity and type of community to the mean number of children under age 10 per "mother" for marriages of five to nine years' duration: East North Central States, 1930.

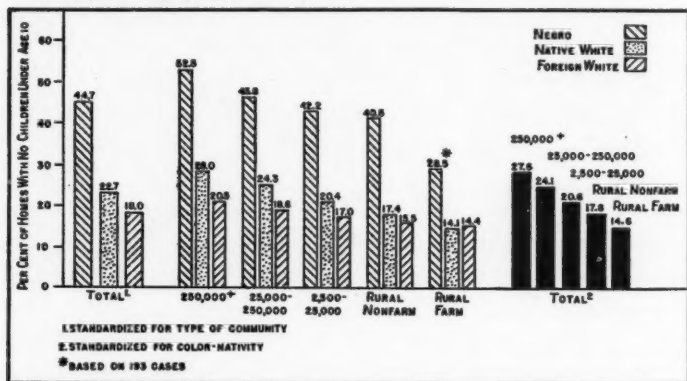
of the means for Negroes to those for the native and foreign-born white populations is most striking. In each type of community the average number of children per "mother" was higher for Negroes not only than that for the native whites, but also than that for the foreign-born whites; and the differences were large. For all communities combined the Negro mean exceeded that for the foreign-born whites by 18 per cent and that for the native whites by 26 per cent.

This shift in relationships when the base is changed from wives to "mothers" resolves the difficulties presented in reconciling the evidence given by studies by birth rates and by those of contraceptive practice. In Northern cities the general fertility rate for married women is lower for Negroes than for whites. On the other hand, virtually every study of birth control has shown that contraceptive practice is both less prevalent and less effective among Negroes

than among whites.⁶ The point is that studies of contraceptive practice deal almost entirely with women who have had at least one child. They therefore picture a situation similar to that shown in Figure 5 rather than to that shown in Figure 4.

The apparent conflict results entirely from differences in the proportions of childless families. This fact is clearly shown in Figure 6 and the bottom panel of Table 1, which presents, for the same groups considered in Figures 4 and 5, the per cent of couples married five to nine years having no children in the home. The proportions of Negro families childless were startlingly high. They ranged from about 30 per cent for the few cases of rural-farm families to more than 50 per cent in large cities. For all types of communities combined about 45 per cent of the Negro families were childless. This figure is nearly twice as large as that for native whites and almost two and one-half times as large as that for foreign-born whites. The proportion of Negro homes without children was increased by the low survival rates of the children, but the bias was canceled in part by the exclusion of secondary families. Undoubt-

Fig. 6. Relation of color-nativity and type of community to percentage of homes with no children under age 10, for marriages of five to nine years' duration: East North Central States, 1930.



⁶ See for example Pearl, Raymond: Contraception and Fertility in 4,945 Married Women. *Human Biology*, May, 1934, vi, No. 2, pp. 355-401.

edly the high proportion of young Negro couples without any children was due primarily to actual childlessness. Unpublished results somewhat similar to those presented here for the East North Central States have also been obtained from Harlem by the Milbank Memorial Fund from a special sampling census which dealt with children born rather than with those living at home.⁷

Neither of these studies yields direct evidence of the causes of childlessness among Negroes. It seems likely that much actual sterility is involved, but the large proportion of women who go outside of the home to work may also be a factor. Such explanations will remain speculative until special studies are directed to the problem. Meantime, it is no speculation to say that the low fertility of young Negro marriages comes entirely from the high proportion of childlessness, and that apart from the childless, Negro couples are more fertile than those of either the native or foreign-born white population. Moreover, it is worth noting that this fact can be shown directly only by census data on the fertility of marriage.

The differences in the proportion of childless families by type of community ran about as would be expected. For all color-nativity classes combined childless families formed about 15 per cent of the total in the rural-farm group and about 28 per cent of the total in large cities. Since these data exclude secondary families and children who have died, include related children not borne by the wife, and deal with marriages of less than ten years' duration, the ratios must not be interpreted as indicating the proportion of marriages which remained permanently childless.

In Figure 7 and Table 3 the average numbers of children per wife are given for each of the groups previously considered, further subdivided by value of the home. Averages based on fewer than 200 cases are not shown. Two points about value-of-home data should be noted. First, values of rented homes were roughly estimated as

⁷ Kiser, Clyde V.: *Fertility of Harlem Negroes. The Milbank Memorial Fund Quarterly*, July, 1935, xiii, No. 3, pp. 273-285. Data concerning childlessness are not yet published.

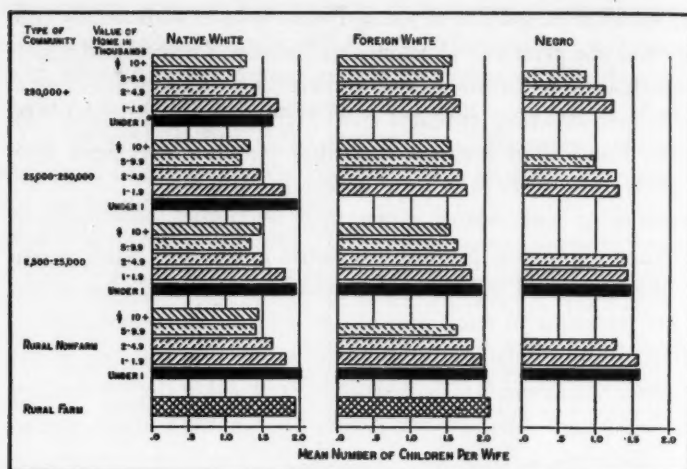


Fig. 7. Relation in each color-nativity group of value of home and type of community to mean number of children under age 10 per wife, for marriages of five to nine years' duration: East North Central States, 1930. (Classes with less than 200 cases omitted.)

one hundred times the monthly rent. Second, similar value groups do not distinguish similar standard-of-living groups in different types of communities and in different color-nativity classes. Negroes, for example, probably pay more than white persons for similar property in Northern communities.

The chief relations shown by the figure are clear enough. In spite of the biases noted above, the average number of children in comparable value groups was in general smallest in the large cities and largest in the rural-nonfarm group. In general, also, the averages for comparable value classes were lowest for the Negroes, intermediate for the native whites, and highest for the foreign-born whites.

Particular interest attaches to the association between value of home and average number of children because of the information it yields on the association between fertility and economic status. The present material presents the only large body of data available

| TYPE OF COMMUNITY AND VALUE OF HOME | CHILDREN UNDER AGE 10 PER WIFE | | | NUMBER OF WIVES | | |
|---|-----------------------------------|--------------|-------|-----------------|--------------|-------|
| | White | | Negro | White | | Negro |
| | Native | Foreign-Born | | Native | Foreign-Born | |
| 250,000+ | | | | | | |
| \$10,000+ | 1.29 | 1.54 | — | 13,528 | 4,684 | 168 |
| 5,000—9,999 | 1.13 | 1.42 | .86 | 67,671 | 25,177 | 3,060 |
| 2,000—4,999 | 1.41 | 1.57 | 1.12 | 72,423 | 31,456 | 9,440 |
| 1,000—1,999 | 1.70 | 1.67 | 1.25 | 9,005 | 4,669 | 2,422 |
| Under \$1,000 | 1.63 | — | — | 413 | 128 | 145 |
| 25,000—250,000 | | | | | | |
| \$10,000+ | 1.33 | 1.54 | — | 6,585 | 1,135 | 28 |
| 5,000—9,999 | 1.22 | 1.56 | .97 | 35,364 | 6,249 | 202 |
| 2,000—4,999 | 1.46 | 1.69 | 1.27 | 61,862 | 10,896 | 2,413 |
| 1,000—1,999 | 1.80 | 1.75 | 1.29 | 11,506 | 1,797 | 1,514 |
| Under \$1,000 | 1.96 | — | — | 1,113 | 92 | 161 |
| 2,500—25,000 | | | | | | |
| \$10,000+ | 1.47 | 1.52 | — | 6,318 | 669 | 7 |
| 5,000—9,999 | 1.34 | 1.63 | — | 19,135 | 2,868 | 48 |
| 2,000—4,999 | 1.50 | 1.76 | 1.41 | 48,291 | 5,659 | 577 |
| 1,000—1,999 | 1.79 | 1.80 | 1.44 | 20,777 | 1,812 | 714 |
| Under \$1,000 | 1.96 | 1.96 | 1.47 | 4,144 | 396 | 244 |
| Rural Nonfarm | | | | | | |
| \$10,000+ | 1.45 | — | — | 1,758 | 175 | 3 |
| 5,000—9,999 | 1.40 | 1.62 | — | 9,709 | 1,084 | 11 |
| 2,000—4,999 | 1.62 | 1.84 | 1.28 | 35,655 | 3,209 | 207 |
| 1,000—1,999 | 1.81 | 1.96 | 1.58 | 31,982 | 1,975 | 421 |
| Under \$1,000 | 2.01 | 2.01 | 1.59 | 18,686 | 1,239 | 350 |
| Rural Farm | | | | | | |
| | 1.94 | 2.07 | — | 80,023 | 3,641 | 193 |

Table 3. Average number of children under age 10 living at home per wife for marriages of five to nine years' duration classified by color-nativity, type of community, and value of home: East North Central States, 1930.

since 1910 that permits a relatively direct study of this relation. It is clear from Figure 7 that in general fertility and economic status continued to be inversely associated in marriages of less than ten years' duration of each color-nativity group in each type of community. Lack of comparability of the value classes makes compari-

sons of the strength of this inverse association between communities and color-nativity classes a doubtful procedure.

The exceptions to the inverse association between fertility and economic status are more interesting than the rule. In one case, that of the native white families in large cities, the average number of children was smaller in families with homes valued at less than \$1,000 than in those whose homes were worth from \$1,000 to \$2,000. Examination of the data shows a very large proportion of childless families in the poorest group, which suggests that in this instance the absence of children made the small home of low value possible.

At the other end of the scale the average numbers of children were frequently larger in families with homes valued at \$10,000 or more than in those of the \$5,000 to \$10,000 class. This relation existed among the native-white families of each type of community and among the foreign-born white families of the large cities. Similar results have been obtained from other studies. For example, Whelpton has shown that in the most expensive census tracts of certain cities the ratio of children to women of childbearing age tended to increase with the median rental.⁸ In a recent article Kiser has shown on the basis of data for five cities gathered by the National Health Survey, that the annual birth rate was higher in the professional than in the business class and higher in the class with incomes of \$3,000 or more than in that with incomes of between \$2,000 and \$3,000.⁹ The fact of a direct association between fertility and economic status in some of the upper economic groups is becoming clear.

The interpretation of this direct association is less certain. The facts are not incompatible with two different views. One is that the greater fertility of couples with homes worth \$10,000 or more than

⁸ Whelpton, P. K.: Geographic and Economic Differentials in Fertility. *The Annals of the American Academy of Political and Social Science*, November, 1936, 188, pp. 37-55.

⁹ Kiser, Clyde V.: Variations in Birth Rates According to Occupational Status, Family Income, and Educational Attainment. *The Milbank Memorial Fund Quarterly*, January, 1938, xvi, No. 1, pp. 39-56.

of those with homes worth from \$5,000 to \$10,000 is merely another illustration of the direct association of fertility and income within similar broad social groups. There is some evidence suggesting this type of direct association as early as 1910.¹⁰ The writer is not inclined to accept this interpretation because the economic difference of the two groups was large, and because the pattern did not extend to the foreign-born outside of large cities.

The other interpretation is that the direct association of fertility and economic status among families with homes worth \$5,000 or more represents the beginning of a reversal in the established inverse association, similar to that which has been reported in several European cities.¹¹ This is the view that the writer is inclined to accept provisionally. The established inverse relation between fertility and social-economic status has been to a large extent the by-product of a transition from high to low levels of fertility, brought about chiefly through the gradual acceptance of birth control. Apparently the downward trend got under way sooner in the upper economic groups than in the lower, in the native-white population than in the foreign-born, and in the large cities than in the small cities and rural communities. As the practice of family limitation becomes generally accepted, one would expect fertility differentials to narrow. Perhaps, in some instances, they will reverse so that the number of children varies directly with the ability of the parents to support them. One would expect such a reversal to appear first in those groups where the trend has most nearly run its course. This pattern is the one presented in Figure 7. The direct association of fertility and economic status appeared only in the upper economic groups and in them was confined to the native-white population and the least fertile section of the foreign-born population. The beginning of a reversal in the standard inverse association between fertility and economic status is strongly suggested. How-

¹⁰ Sydenstricker, Edgar and Notestein, Frank W.: *op. cit.*

¹¹ Edin, Karl Arvid and Hutchinson, Edward P.: *STUDIES OF DIFFERENTIAL FERTILITY IN SWEDEN*. London. P. S. King and Son, Ltd. 1935.

ever, two facts must be remembered. First, the evidence relates to marriages of less than ten years' duration and not to completed families. Second, the interpretation of the evidence is speculative and will remain so until new evidence makes the direct study of time trends possible.

The more important results of this preliminary study of differential fertility, based on the number of children under age 10 living in the homes of couples married five to nine years and resident in the East North Central States in 1930, may be summarized as follows:

(1) In each group examined fertility was inversely associated with size of community. The variation by type of community was strongest among Negroes and weakest among foreign-born whites.

(2) In each type of community, with the doubtful exception of the rural-farm group, Negroes exhibited lower average fertility than native whites who in turn were less fertile than foreign-born whites.

(3) The lower average fertility of Negroes was due entirely to the startlingly high proportion of childless Negro families. When the comparison was limited to "mothers" the Negroes were found to be more fertile than either the native or the foreign-born whites.

(4) In general, fertility and economic status were inversely associated, but exceptions were found in the highest value-of-home groups for the native white families of each type of community and for the foreign-born white families of large cities. The direct association in the latter groups is interpreted tentatively as the beginning of a reversal in the standard inverse association of fertility and economic status.

The data afforded by the 1930 family card are clearly of value. However, for the analysis of differential fertility they suffer from serious defects. They limit the major analysis to marriages of less than ten years' duration; they fail to take account of differences in child survival; they make extremely difficult the inclusion of second-

dary families, which are characteristically small. They fail to permit an adequate study of the incidence of childlessness and of large families. It is the writer's opinion that data relating directly to the fertility of the natural family, even if collected only for selected areas, would be more useful than material of the 1930 type secured for the entire country. Such samples would fill the more important needs at a considerable saving of expense. It is the writer's further opinion that if such samples are taken in 1940, every effort should be made, probably by private groups, to set up within the sample areas a series of coordinated intensive studies directed to the specific causes underlying fertility differentials. Only by some such procedure of integrated and increasingly penetrating research will the causal sequences that are bringing sweeping changes in our population ever be understood.

IMPAIRMENTS IN A RURAL POPULATION

by RALPH E. WHEELER, M.D.*

IV. PREVALENCE OF IMPAIRMENTS BY AGE AND SEX

BEFORE attempting to evaluate the significance of variations in the medical examination data with respect to age and sex, it will be necessary to review some of the factors which influence these variations only indirectly. While the exact effect of these factors must remain undetermined, there is a strong probability that they influence the data at more than one point. Some are psychological and affect the interpretation of the history findings more than that of the physical and laboratory findings. Among such factors may be mentioned the awareness of and apprehension about symptoms, modesty and secretiveness on the part of the patient. These vary quite definitely with age and to some extent with sex as well. Again, the form of examination given varies quite definitely with age and to a more limited extent with sex. This is only in part because of anatomical changes and differences. Finally, the extent to which a given condition may be identified varies with both age and sex; with age because a complete examination requires a certain degree of cooperation from the patient and this, particularly at the extremes of life, is not always forthcoming; with sex because of the more frequent occurrence of somatic limitations on diagnosis, notably adiposity among females of this study.

The above do not constitute limitations in the interpretation of these data alone but are common to most of the reported medical examination data and must be kept in mind when interpreting them. A specific limitation of these data, however, is that clinic sessions were usually held in the afternoon and that women were,

* This is the fourth in a series of notes on the physical status of a rural population. The first and second appeared in the July and October, 1937, issues of *The Milbank Memorial Fund Quarterly*, and the third in the January, 1938, issue.

in general, more readily able to attend. They may therefore constitute a more random sample than the men for whom attendance often entailed a sacrifice of working time. Clinics were also held in the evening in an effort to counterbalance this factor but it seems unlikely that they were started soon enough to make up wholly for the possible defect.

Only the total sample data are given in this section, notable variations between the figures for this sample and those for the true sample being indicated textually. The same differentiation between data from history alone and data from other sources as well has been maintained here as in former sections.

The prevalence data here presented are almost unique in two respects: they cover the entire life span and they were derived from a rural population, not wholly free from selective errors but far more so than hospital or ordinary diagnostic clinic records. Comparative data are therefore hard to find and must be taken from a number of sources. This introduces errors due to differing methods of observation and due to the fact that urban populations, for which the most extensive data have accumulated, show somewhat different findings.¹

With these qualifications in mind, brief comparisons have been made of the present findings with those of other studies.

Data on the prevalence of certain specific chronic conditions from the field survey of the Committee on the Costs of Medical Care have been presented in detail for age by Collins.² Comparison of trends with age only can be made as sex-specific data for that study have not as yet appeared and a discussion of the differences in degree shown by the two studies is beyond the scope of the present section. Because a morbidity survey of the type reported

¹ Sydenstricker, Edgar: *HEALTH AND ENVIRONMENT*. New York, McGraw-Hill Publishing Company (Social Trends Monographs), 1933. See Chapter IV, a discussion of urban-rural differences in morbidity, specifically Table 12, p. 63.

² Collins, Selwyn D.: Age Incidence of Specific Causes of Illness. *Public Health Reports*, United States Public Health Service, October 11, 1935, 50, No. 41, pp. 1404-1427. Further reference in this section to the Costs of Medical Care study pertain to data cited in this article.

by Collins includes a great many acute conditions as well as chronic ones and does not offer detailed data on physical findings, the comparison can only be made for certain categories, but these in general agree in trend with the data presented here.

More detailed comparisons may be made with the results of studies based on medical examinations but these have usually been conducted with populations restricted in some degree as to age, sex, occupation or residence, and such comparisons are fraught with qualifications. The most notable analysis of this type is that of the records of the Life Extension Institute, from which data on ages from twenty years to the end of life have been made available by Sydenstricker and Britten.³ A detailed presentation of findings by sex and by age after the age of twenty years has been made by Britten,⁴ and shows some correspondence with the findings of the present study.

A. HISTORY DATA

The age and sex specific rates for persons mentioning certain leading symptoms are given in Table 6 and are shown graphically in Figure 2. The figures show, with few exceptions, an increasing prevalence with age. This trend is, however, lacking for *frequent or prolonged coughs or colds*, and for *chronic or recurring skin trouble*. The symptom of *headache* seems to be mentioned more frequently by persons in the middle ages of life, and this trend is also evident in the rates for this symptom from the Costs of Medical Care study.

The most striking fact about these symptom data, however, are the relatively high rates for females. These are probably not wholly to be explained upon an intrinsic sex-difference in prevalence as

³ Sydenstricker, Edgar and Britten, Rollo H.: Physical Impairments of Adult Life. *American Journal of Hygiene*, January, 1930, xi, No. 1, pp. 73-135. The reference includes Parts 1 and 2 of this extensive study giving important data from examinations of 100,924 males.

⁴ Britten, Rollo H.: Sex Differences in the Physical Impairments of Adult Life. *American Journal of Hygiene*, May, 1931, xiii, No. 3, pp. 741-770. Further reference in this section to the Life Extension Institute records pertain to data cited in this article.

there are a number of psychological factors which may have contributed to the excess rates among females. The leading symptom record, for example, was taken by the clinic nurse whose acquaintance many of the women had made before coming for examination and with whom they could more freely discuss their symptoms. The corresponding data for the Life Extension Institute records were collected somewhat differently, the men being questioned by male examiners and women by female examiners, and excess rates for females appear chiefly for *constipation* and *frequent or painful urination*.

Table 6. Number and percentages of examined persons, by age and sex, mentioning specified leading symptoms; total sample.

| SYMPTOM | Sex | RATES, PER CENT | | | | | | CASES | | | | | | EXAMINED ALL AGES | |
|-----------------------|-----|---------------------------------------|-------------------|----------|-----------|-----------|-----------|-------|-------------------|----------|-----------|-----------|-----------|----------------------|-----|
| | | All Ages Standardized ¹ | All Ages Crude | 0- 14 | 15- 29 | 30- 44 | 45- 59 | 60+ | Total All Ages | 0- 14 | 15- 29 | 30- 44 | 45- 59 | | 60+ |
| | | | | | | | | | | | | | | | |
| Disziness | M | 11.0 | 11.6 | 1.8 | 6.4 | 19.6 | 20.9 | 28.6 | 65 | 4 | 6 | 19 | 18 | 18 | 560 |
| | F | 18.9 | 20.3 | 4.0 | 20.1 | 23.8 | 37.0 | 47.3 | 135 | 9 | 30 | 30 | 40 | 26 | 664 |
| Headache | M | 19.3 | 19.5 | 9.5 | 16.0 | 37.1 | 31.4 | 15.9 | 109 | 21 | 15 | 36 | 27 | 10 | 560 |
| | F | 32.1 | 33.3 | 13.7 | 38.3 | 48.4 | 48.1 | 36.4 | 221 | 31 | 57 | 61 | 52 | 20 | 664 |
| Frequent or Prolonged | M | 22.1 | 21.8 | 16.8 | 24.5 | 30.9 | 19.8 | 23.8 | 122 | 37 | 23 | 30 | 17 | 15 | 560 |
| Colds or Coughs | F | 21.5 | 21.7 | 17.3 | 26.8 | 17.5 | 25.0 | 29.1 | 144 | 39 | 40 | 22 | 27 | 16 | 664 |
| Shortness of Breath | M | 14.9 | 15.9 | 2.3 | 6.4 | 24.7 | 39.5 | 31.7 | 89 | 5 | 6 | 24 | 34 | 20 | 560 |
| | F | 20.1 | 22.4 | 1.8 | 13.4 | 33.3 | 49.1 | 54.5 | 149 | 4 | 20 | 42 | 53 | 30 | 664 |
| Cardiac Pain | M | 7.4 | 7.5 | 0.9 | 7.4 | 9.3 | 11.6 | 22.2 | 42 | 2 | 7 | 9 | 10 | 14 | 560 |
| | F | 12.8 | 13.9 | 2.2 | 14.1 | 12.7 | 28.7 | 34.5 | 92 | 5 | 21 | 16 | 31 | 19 | 664 |
| Constipation | M | 16.7 | 17.1 | 9.6 | 12.8 | 23.7 | 30.2 | 22.2 | 96 | 21 | 12 | 23 | 26 | 14 | 560 |
| | F | 29.1 | 30.9 | 10.2 | 32.2 | 34.1 | 52.8 | 61.8 | 205 | 23 | 48 | 43 | 57 | 34 | 664 |
| Periodic or Habitual | M | 13.4 | 13.7 | 5.0 | 10.6 | 24.7 | 20.9 | 22.2 | 77 | 11 | 10 | 24 | 18 | 14 | 560 |
| Use of Laxatives | F | 24.6 | 26.1 | 9.3 | 27.5 | 28.6 | 42.6 | 52.7 | 173 | 21 | 41 | 36 | 46 | 29 | 664 |
| Abdominal Complaints | M | 15.5 | 15.7 | 4.6 | 14.9 | 23.7 | 20.9 | 36.5 | 88 | 10 | 14 | 23 | 18 | 23 | 560 |
| | F | 23.2 | 25.0 | 8.0 | 20.1 | 34.9 | 47.2 | 41.8 | 166 | 18 | 30 | 44 | 51 | 23 | 664 |
| Frequent Urination | M | 8.7 | 9.5 | 5.5 | 4.3 | 7.2 | 16.3 | 25.4 | 53 | 12 | 4 | 7 | 14 | 16 | 560 |
| | F | 10.8 | 11.9 | 4.9 | 5.4 | 11.9 | 23.1 | 36.4 | 79 | 11 | 8 | 15 | 25 | 20 | 664 |
| Difficult or Painful | M | 2.7 | 2.9 | 0.4 | 1.6 | 9.3 | 6.3 | 16 | 1 | 0 | 3 | 8 | 4 | 4 | 560 |
| Urination | F | 5.5 | 6.2 | 0.4 | 2.7 | 7.9 | 13.0 | 21.8 | 41 | 1 | 4 | 10 | 14 | 12 | 664 |
| Chronic or Recurring | M | 6.6 | 6.2 | 3.2 | 9.6 | 8.2 | 8.1 | 6.3 | 35 | 7 | 9 | 8 | 7 | 4 | 560 |
| Skin Trouble | F | 8.9 | 9.0 | 8.0 | 7.4 | 11.9 | 10.2 | 9.1 | 60 | 18 | 11 | 15 | 11 | 5 | 664 |
| "Rheumatic" Pains | M | 20.3 | 21.4 | 1.8 | 11.7 | 34.0 | 47.7 | 49.2 | 120 | 4 | 11 | 33 | 41 | 31 | 560 |
| | F | 21.2 | 23.6 | 4.4 | 10.1 | 34.1 | 47.2 | 69.1 | 157 | 10 | 15 | 43 | 51 | 38 | 664 |

¹ Standardized to rural white population, United States Census, 1930.

Each sex was standardized to the age distribution of the corresponding sex; the age distribution in the two sexes showed very slight differences.

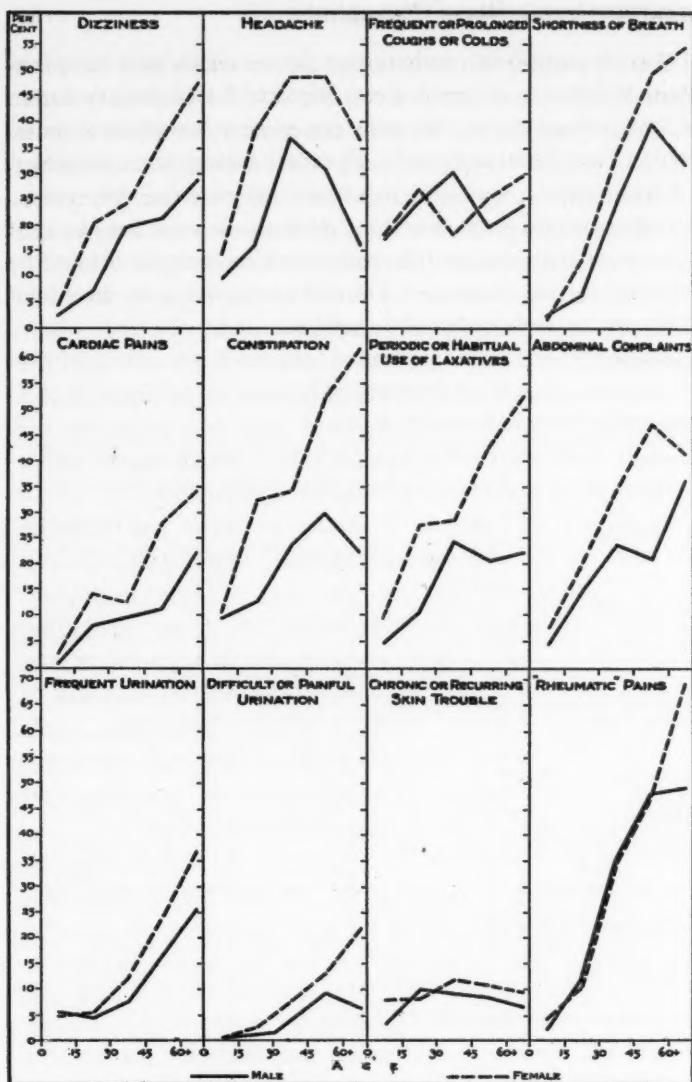


Fig. 2. Percentages of males and of females mentioning leading symptoms at different ages; total sample.

It was this unspecific symptom group which showed the most definite differences between true sample and total sample rates. The true sample rates fall quite consistently lower than those shown in Table 6 and in Figure 2. The curve for any given symptom for females of the true sample usually lies between the corresponding curves for females and for males of the total sample, and the curve for males of the true sample lies consistently below the corresponding curve for males. The differences shown by these two samples are therefore rather of degree than kind.

The age and sex prevalence of conditions diagnosed upon the basis of history record is presented in Table 7 and in Figure 3, and in general offers a very different picture from that outlined in the discussion of symptoms. The variations here are somewhat harder to evaluate in view of the relatively small case totals but rates tend to show the highest figures in the middle ages of life and to decline at the older ages. This is especially true of psychoneurosis, diseases of women, and of lumbago and backache. The Costs of Medical Care data show the same trend for the last two of these conditions.

The absence of cases upon which to obtain rates for *mental deficiency* at the older ages of life may be an artifact, traceable to the difficulty of evaluating, during a routine examination, a person's mental status after the school period. There is also the possibility that such as have not been able to learn to live under rural conditions have died or have been placed in institutions.

The excess rates appearing for females in the leading symptom group are here only in evidence for psychoneurosis; bronchitis, indeed, shows an excess among males.

When comparison of these data are made with the Life Extension Institute findings, a most significant difference appears for *diseases of women*. Rates in that study for dysmenorrhea, leukorrhea, and for profuse and irregular menstruation (essentially a combination of the two categories shown here) decrease from 19.3 per cent at ages 20-29 to 0.9 per cent at 60 years and over, while the

| CONDITION OR CLASS OF CONDITION | SEX | RATES, PER CENT | | | | | | CASES | | | | | | Examined All Ages | | |
|------------------------------------|-----|---------------------------------------|-------------------|----------|-----------|-----------|-----------|-------|-------------------|----------|-----------|-----------|-----------|----------------------|------------------|--|
| | | All Ages Standardized ¹ | All Ages Crude | 0- 14 | 15- 29 | 30- 44 | 45- 59 | 60+ | Total All Ages | 0- 14 | 15- 29 | 30- 44 | 45- 59 | | 60 + | |
| | | | | | | | | | | | | | | | | |
| <i>Nervous System</i> | | | | | | | | | | | | | | | | |
| Mental Deficiency | M | — | 1.1 | 1.8 | 2.1 | — | — | — | 6 | 4 | 2 | 0 | 0 | 0 | 560 | |
| | F | — | 1.5 | 2.2 | 2.7 | — | 0.4 | — | 10 | 5 | 4 | 0 | 1 | 0 | 664 | |
| Psychoneurosis | M | 3.1 | 3.0 | 0.9 | 3.2 | 7.2 | 3.4 | — | 17 | 2 | 3 | 7 | 5 | 0 | 560 | |
| | F | 5.4 | 5.7 | 1.3 | 6.0 | 11.1 | 9.3 | 3.6 | 38 | 3 | 9 | 14 | 10 | 2 | 664 | |
| Other | M | 2.4 | 2.5 | 0.6 | — | 7.2 | 4.6 | 1.6 | 14 | 0 | 2 | 7 | 4 | 1 | 560 | |
| | F | 1.9 | 2.1 | 0.5 | — | 3.2 | 4.6 | 5.4 | 14 | 0 | 2 | 4 | 5 | 3 | 664 | |
| <i>Respiratory System</i> | | | | | | | | | | | | | | | | |
| Bronchitis | M | 9.2 | 8.9 | 2.3 | 11.7 | 15.5 | 10.5 | 15.9 | 50 | 5 | 11 | 15 | 9 | 10 | 560 | |
| | F | 5.0 | 5.3 | 2.6 | 4.7 | 6.3 | 6.5 | 12.7 | 35 | 6 | 7 | 8 | 7 | 7 | 664 | |
| Asthma | M | 1.2 | 1.2 | 0.4 | 1.1 | 3.1 | 1.2 | 1.6 | 7 | 1 | 1 | 3 | 1 | 1 | 560 | |
| | F | 1.1 | 1.2 | 0.4 | 0.7 | 2.4 | 1.8 | 1.8 | 8 | 1 | 1 | 3 | 2 | 1 | 664 | |
| <i>Gastrointestinal System</i> | | | | | | | | | | | | | | | | |
| Hemorrhoids | M | 5.0 | 5.2 | 1.4 | 3.2 | 10.3 | 10.5 | 6.3 | 29 | 3 | 3 | 10 | 9 | 4 | 560 | |
| | F | 6.7 | 7.4 | 0.4 | 6.0 | 10.3 | 13.9 | 20.0 | 49 | 1 | 9 | 13 | 15 | 11 | 664 | |
| Other | M | 2.3 | 2.5 | 0.6 | 0.6 | 4.1 | 7.0 | 3.2 | 14 | 0 | 2 | 4 | 6 | 2 | 560 | |
| | F | 1.6 | 1.7 | 0.9 | 2.0 | 2.4 | 1.8 | 1.8 | 11 | 2 | 3 | 3 | 2 | 1 | 664 | |
| <i>Diseases of Women</i> | | | | | | | | | | | | | | | | |
| Menstrual | F | — | 5.1 | a | 6.7 | 3.2 | a | a | 14 ¹ | a | 10 | 4 | a | a | 275 ² | |
| Other | F | 1.6 | 1.5 | 0.4 | 2.7 | 3.2 | 0.9 | — | 10 | 1 | 4 | 4 | 1 | 0 | 664 | |
| <i>Skeletal System</i> | | | | | | | | | | | | | | | | |
| Lumbago and Back-ache | M | 4.3 | 4.3 | 0.4 | 4.3 | 8.2 | 9.3 | 4.8 | 24 | 1 | 4 | 8 | 8 | 3 | 560 | |
| | F | 4.5 | 4.8 | 0.4 | 5.4 | 8.7 | 9.3 | 3.6 | 32 | 1 | 8 | 11 | 10 | 2 | 664 | |

a No data at these ages.

¹ Standardized to rural white population, United States Census, 1930. Each sex was standardized to the age distribution of the corresponding sex; the age distribution in the two sexes showed very slight differences.

² Only ages 15-44 are considered here.

Table 7. Number and percentages of persons examined, by age and sex, with specified conditions diagnosed primarily on the basis of history; total sample.

combined rates of the two exclusive categories for the present study fall only from 9.4 per cent at ages 15-29 to 0.9 per cent in the oldest age group.

The true sample data for this group of conditions reveal a somewhat lower prevalence for both males and females, but a higher incidence does appear for lumbago and backache.

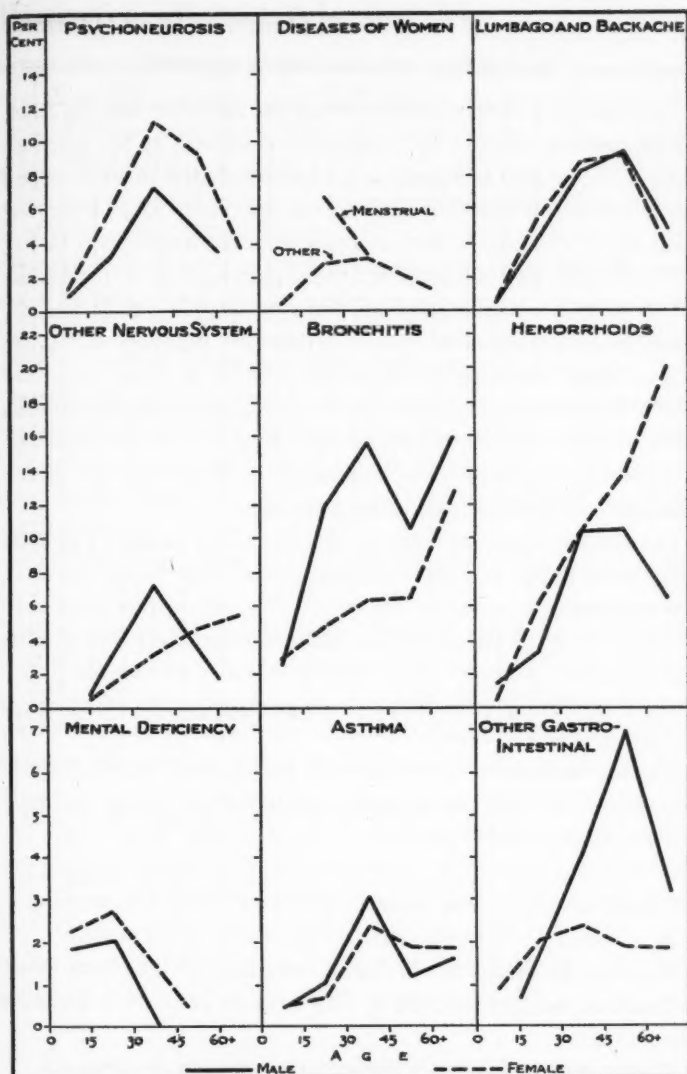


Fig. 3. Percentages of males and of females at different ages with specified impairment diagnosed on the basis of history; total sample.

B. PHYSICAL AND LABORATORY FINDINGS

The data presented in Table 8 detail the rates for, and the number of cases of, each of the conditions discussed in the previous section. The graphs in Figures 4-9, however, do not include certain conditions for which the data are of uncertain value from the point of view of the present analysis. Relative weight was one of the conditions thus omitted from the graphs because it is generally felt to be an uncertain index of under or overweight. It was the observation of at least one examiner, however, that persons "20 per cent or more overweight" did in fact tend to be obese, and that obesity was a far more common finding among females than among males in this area. The relative overweight data in Table 8 indicate that obesity, by this index at least, tends to increase in prevalence with age and predominates among females.

The various degrees of defective *distance vision* all show a definite relationship to age in their prevalence; some of the variations have, however, been concealed by the large age groups which it has been necessary to adopt for this study. More detailed data over the life span has been presented by Collins⁵ for males and shows a progressive increase in prevalence with age only for the more severe degrees of defect.

The sex differences are definite in that females, particularly at ages under 60 years, show higher rates for all except the most extreme degree—blindness or virtual blindness. This excess has been recorded for school children by Collins,⁶ and it appears for the classification 20/30 or worse in the Life Extension Institute data at ages from 20 to 50 years when an excess for males begins.

The rates for both sexes also tend to be higher than those given for men and women in Table 8. This latter is, however, a probable

⁵ Collins, Selwyn D.: Variations in Eyesight at Different Ages. *Public Health Reports*, United States Public Health Service, December 19, 1924, 39, No. 51, pp. 3189-3194.

⁶ Collins, Selwyn D.: Eyesight of the School Child as Determined by Snellen Test. *Public Health Reports*, United States Public Health Service, November 28, 1924, 39, No. 48, pp. 3013-3027.

urban-rural difference as Sydenstricker and Britten⁷ have shown that there is a generally lower incidence of defective vision among agricultural as compared with other occupational groups drawn primarily from urban areas.

The prevalence of *impacted cerumen* appears to vary less definitely with age, but quite definitely at the older ages with sex. As these data are derived only from the group examined otoscopically, these sex-differences are probably actual ones. It has already been noted that small foreign bodies inserted in the ear were often found as a nucleus for the impaction. Many of the wax plugs removed from the ears of men contained hairs cut at both ends, quite probably blown into the ear by the barber when clearing the outer ears after haircuts, and some contained hayseed introduced in the course of farm work. These may have acted as irritants leading to a greater wax production.

The variations in *deafness* are rather more striking with age and are less conclusive as regards sex.

Variations in the prevalence of *deviated septum* are not easily interpreted. The nasal passages were examined only through the nostrils, and it is possible that the less frequent occurrence in childhood and among women may be explained in part by the fact that the smaller nostril of children and the usually smaller and narrower nostril in females permit a less complete examination. However, the differences are quite striking and this interpretation cannot entirely explain the discrepancies. Former fractures of the nose with resulting septal deviations were encountered only three times in men and do not account for the differences which would appear to be at least in part actual developmental ones. The Life Extension Institute findings show consistently higher rates for both sexes but the differences are less marked than in the present data and the trend is very definitely *downward* with age.

⁷ Sydenstricker, Edgar and Britten, Rollo H.: Physical Impairments and Occupational Class. *Public Health Reports*, United States Public Health Service, August 22, 1930, xlv, No. 34, pp. 1927-1962.

| FINDING | SEX | RATES, PER CENT | | | | | | | CASES | | | | | | |
|---|-----|------------------------------------|----------------|-------------------|-------|-------|-------|-------|----------------|-----------------|-------|-------|-------|-----|-------------------|
| | | All Ages Standardized ¹ | All Ages Crude | 0-14 | 15-29 | 30-44 | 45-59 | 60+ | Total All Ages | 0-14 | 15-29 | 30-44 | 45-59 | 60+ | Examined All Ages |
| <i>Weight</i> | | | | | | | | | | | | | | | |
| 20 per cent or more overweight, relative to height and age | M | 7.0 | 7.3 | 4.7 | 4.6 | 8.7 | 13.4 | 9.8 | 39 | 10 | 4 | 8 | 11 | 6 | 536 |
| | F | 18.6 | 20.1 | 7.7 | 10.9 | 32.2 | 35.5 | 38.9 | 131 | 17 | 10 | 39 | 38 | 21 | 651 |
| 15 per cent or more underweight, relative to height and age | M | 5.9 | 6.0 | 3.7 | 5.7 | 7.6 | 3.7 | 14.8 | 32 | 8 | 5 | 7 | 3 | 9 | 536 |
| | F | 9.4 | 9.4 | 6.3 | 12.9 | 9.9 | 7.5 | 14.8 | 61 | 14 | 19 | 12 | 8 | 8 | 651 |
| <i>Eyes, Distance Vision</i> | | | | | | | | | | | | | | | |
| 20/30 or worse, one or both eyes without glasses | M | 35.7 | 40.4 | 21.4 ¹ | 22.0 | 30.8 | 57.4 | 88.6 | 110 | 15 ² | 13 | 16 | 27 | 39 | 272 |
| | F | 45.9 | 49.5 | 31.2 ² | 34.1 | 44.3 | 78.9 | 86.1 | 155 | 23 ³ | 29 | 27 | 45 | 31 | 313 |
| 20/40 or worse, one or both eyes without glasses | M | 25.9 | 30.0 | 11.4 ² | 18.6 | 21.2 | 38.3 | 75.0 | 81 | 8 ³ | 11 | 11 | 18 | 33 | 272 |
| | F | 32.0 | 35.8 | 14.9 ² | 24.7 | 26.2 | 61.4 | 80.6 | 112 | 11 ³ | 21 | 16 | 35 | 29 | 313 |
| 20/50 or worse, one or both eyes without glasses | M | 19.6 | 23.2 | 7.1 ² | 11.9 | 13.5 | 34.0 | 63.6 | 63 | 5 ³ | 7 | 7 | 16 | 28 | 272 |
| | F | 25.4 | 29.1 | 8.1 ² | 22.4 | 16.4 | 49.1 | 77.8 | 91 | 6 ³ | 19 | 10 | 28 | 28 | 313 |
| Blind or perceiving movement only, as above | M | 2.3 | 2.7 | 1.4 | 0.5 | 2.3 | 14.3 | 14.3 | 15 | 3 | 0 | 1 | 2 | 9 | 560 |
| | F | 1.2 | 1.4 | 0.4 | 0.4 | 2.8 | 7.3 | 7.3 | 9 | 1 | 0 | 1 | 3 | 4 | 664 |
| <i>Ears</i> | | | | | | | | | | | | | | | |
| Impacted cerumen | M | 13.1 | 13.8 | 8.2 | 15.4 | 13.2 | 13.7 | 24.5 | 45 | 9 | 10 | 7 | 7 | 12 | 378 |
| | F | 8.2 | 8.2 | 10.8 | 7.0 | 4.8 | 0.8 | 10.0 | 31 | 14 | 6 | 3 | 4 | 4 | 378 |
| Marked deafness | M | 2.8 | 3.4 | 1.1 | 1.9 | 7.8 | 8.2 | 11.1 | 11 | 2 | 0 | 1 | 4 | 4 | 378 |
| | F | 1.3 | 1.6 | 0.5 | 0.8 | 10.0 | 10.0 | 6 | 6 | 0 | 1 | 1 | 0 | 4 | 378 |
| Other ear | M | — | 1.5 | 1.7 | 1.9 | 1.0 | 1.0 | 5 | 5 | 3 | 0 | 1 | 1 | 0 | 327 |
| | F | — | 2.1 | 0.9 | 3.2 | 3.4 | 5.0 | 8 | 8 | 0 | 2 | 2 | 2 | 2 | 378 |
| <i>Nose</i> | | | | | | | | | | | | | | | |
| Deviated nasal septum, moderate or marked | M | 15.0 | 15.6 | 5.7 | 12.0 | 30.4 | 19.5 | 25.4 | 81 | 11 | 11 | 28 | 16 | 15 | 519 |
| | F | 5.3 | 5.9 | 1.4 | 4.2 | 6.6 | 8.6 | 20.4 | 37 | 3 | 6 | 8 | 9 | 11 | 629 |
| Deviated nasal septum, marked only | M | 4.0 | 4.2 | 1.5 | 2.2 | 8.7 | 7.3 | 5.1 | 22 | 3 | 2 | 8 | 6 | 3 | 519 |
| | F | 0.4 | 0.5 | 0.3 | — | — | — | — | 3 | 0 | 1 | 0 | 0 | 2 | 629 |
| Hypertrophy of turbinates | M | 5.5 | 5.6 | 6.2 | 4.3 | 8.7 | 3.6 | 3.4 | 29 | 12 | 4 | 8 | 3 | 2 | 519 |
| | F | 3.8 | 3.6 | 2.9 | 0.3 | 3.3 | 2.9 | 1.8 | 23 | 6 | 9 | 4 | 3 | 1 | 629 |
| Other nose | M | 2.3 | 2.3 | 0.5 | 3.3 | 1.1 | 3.6 | 6.8 | 12 | 1 | 3 | 1 | 3 | 4 | 519 |
| | F | 1.6 | 1.6 | 1.9 | 1.1 | 1.9 | 1.9 | 1.9 | 10 | 4 | 3 | 0 | 3 | 0 | 629 |
| <i>Mouth</i> | | | | | | | | | | | | | | | |
| Pyorrhea and gingivitis | M | 17.2 | 17.3 | 2.8 | 14.0 | 34.4 | 34.1 | 25.4 | 94 | 6 | 13 | 31 | 28 | 16 | 542 |
| | F | 10.7 | 11.7 | 2.4 | 7.6 | 27.4 | 17.8 | 10.9 | 75 | 5 | 11 | 34 | 19 | 6 | 642 |
| Dental caries, one or more cavities | M | 40.5 | 40.6 | 43.7 | 37.2 | 45.9 | 40.7 | 27.4 | 217 | 93 | 35 | 39 | 33 | 17 | 535 |
| | F | 37.7 | 36.6 | 46.2 | 40.3 | 38.6 | 21.8 | 11.1 | 232 | 102 | 56 | 46 | 22 | 6 | 634 |
| Dental caries, five or more cavities | M | 12.0 | 12.7 | 11.3 | 4.2 | 21.2 | 14.8 | 16.1 | 68 | 24 | 4 | 18 | 12 | 10 | 535 |
| | F | 10.2 | 10.2 | 8.1 | 10.8 | 14.3 | 11.9 | 5.6 | 65 | 18 | 15 | 17 | 12 | 3 | 634 |
| Teeth lost, one or more missing | M | 51.5 | 53.2 | 11.0 | 45.2 | 84.4 | 96.3 | 98.4 | 281 | 22 | 42 | 76 | 79 | 62 | 528 |
| | F | 50.0 | 54.6 | 11.6 | 46.1 | 84.6 | 93.4 | 100.0 | 342 | 24 | 65 | 99 | 99 | 55 | 626 |
| Teeth lost, one set or both | M | 13.6 | 16.5 | — | — | 12.2 | 35.4 | 74.6 | 87 | 0 | 0 | 11 | 29 | 47 | 528 |
| | F | 19.8 | 23.8 | — | 5.0 | 27.4 | 59.4 | 85.4 | 149 | 0 | 7 | 32 | 63 | 47 | 626 |
| Other mouth | M | 2.5 | 2.4 | 1.9 | 3.2 | 4.4 | 1.2 | 1.6 | 13 | 4 | 3 | 4 | 1 | 1 | 542 |
| | F | 1.4 | 1.4 | 1.4 | 1.4 | 0.8 | 1.8 | 1.8 | 9 | 3 | 2 | 1 | 3 | 0 | 642 |
| <i>Throat</i> | | | | | | | | | | | | | | | |
| Tonsils enlarged, buried or infected | M | 44.0 | 44.7 | 45.2 | 39.4 | 41.7 | 43.5 | 57.4 | 244 | 95 | 37 | 40 | 37 | 35 | 546 |
| | F | 40.7 | 41.2 | 42.3 | 33.1 | 42.4 | 45.4 | 47.2 | 270 | 92 | 49 | 53 | 49 | 26 | 656 |
| Tonsils enlarged | M | 22.8 | 23.4 | 41.4 | 14.9 | 16.7 | 10.6 | 3.3 | 128 | 87 | 14 | 16 | 9 | 2 | 546 |
| | F | 23.1 | 22.1 | 38.2 | 16.2 | 12.8 | 13.0 | 12.7 | 145 | 84 | 24 | 16 | 14 | 7 | 656 |
| Tonsils buried | M | 17.7 | 17.9 | 2.4 | 19.1 | 20.8 | 20.4 | 49.2 | 98 | 5 | 18 | 20 | 25 | 30 | 546 |
| | F | 15.4 | 16.8 | 3.2 | 14.2 | 25.6 | 32.4 | 27.3 | 110 | 7 | 21 | 32 | 35 | 15 | 656 |
| Tonsils infected | M | 9.4 | 9.3 | 5.7 | 9.6 | 11.4 | 16.5 | 8.2 | 51 | 12 | 9 | 11 | 14 | 5 | 546 |
| | F | 6.9 | 7.2 | 5.0 | 6.1 | 9.6 | 10.2 | 7.3 | 47 | 11 | 9 | 12 | 11 | 4 | 656 |
| <i>Thyroid</i> | | | | | | | | | | | | | | | |
| Diffuse or nodular enlargement | M | 0.5 | 0.5 | — | 0.5 | — | 0.7 | — | 3 | 0 | 0 | 2 | 1 | 0 | 551 |
| | F | 5.0 | 5.5 | 0.5 | 4.7 | 8.8 | 10.3 | 11.1 | 36 | 1 | 7 | 11 | 11 | 6 | 652 |
| Diffuse enlargement (simple goiter) | M | 0.2 | 0.2 | — | — | — | — | — | 1 | 0 | 0 | 1 | 0 | 0 | 551 |
| | F | 3.1 | 3.4 | 0.5 | 3.4 | 4.0 | 8.4 | 3.7 | 22 | 1 | 5 | 5 | 9 | 2 | 652 |
| <i>Heart</i> | | | | | | | | | | | | | | | |
| Heart disease, all forms | M | 2.9 | 3.6 | 0.6 | — | 0.5 | 27.0 | — | 20 | 0 | 2 | 0 | 1 | 17 | 556 |
| | F | 3.4 | 3.6 | 1.3 | 2.0 | 2.4 | 2.8 | 22.6 | 24 | 3 | 3 | 3 | 3 | 12 | 657 |
| Valvular and congenital | M | 0.7 | 0.7 | 0.6 | — | — | 0.8 | — | 4 | 0 | 2 | 0 | 0 | 2 | 556 |
| | F | 1.4 | 1.4 | 1.3 | 2.0 | — | 1.0 | — | 9 | 3 | 3 | 3 | 0 | 0 | 657 |

Table 8. Number and percentages of examined persons, by age and sex, with specified conditions diagnosed primarily on the basis of physical or laboratory examination; total sample.

| FINDING | SEX | RATES, PER CENT | | | | | | CASES | | | | | | | |
|---|-----|---------------------------------------|-------------------|------|------------------|-------|-------|-------|-------------------|----------------|-------|-------|-------|-----|----------------------|
| | | All Ages Standardized ¹ | All Ages Crude | 0-14 | 15-29 | 30-44 | 45-59 | 60+ | Total All Ages | 0-14 | 15-29 | 30-44 | 45-59 | 60+ | Examined All Ages |
| | | | | | | | | | | | | | | | |
| Blood Pressure | | | | | | | | | | | | | | | |
| Systolic pressure, 160 + mm. | M | 7.0 | 9.9 | | 0.7 ² | 5.5 | 14.4 | 32.8 | 38 | 0 ² | 1 | 5 | 12 | 20 | 385 |
| | F | 12.1 | 16.8 | | 0.5 ² | 7.6 | 35.0 | 64.8 | 80 | 1 ² | 0 | 9 | 35 | 35 | 475 |
| Lungs (including X-ray findings) | | | | | | | | | | | | | | | |
| Nontuberculous pul- monary disease | M | 2.0 | 2.1 | | 0.5 | 5.8 | 9.5 | | 13 | 1 | 0 | 1 | 5 | 6 | 560 |
| | F | 0.6 | 0.8 | — | 0.4 | 1.8 | 3.6 | | 5 | 0 | 0 | 1 | 2 | 2 | 664 |
| Abdomen | | | | | | | | | | | | | | | |
| Findings interpreted as gastrointestinal | M | 0.9 | 0.9 | 0.9 | 1.1 | 1.0 | 0.7 | | 5 | 2 | 1 | 1 | 1 | 0 | 560 |
| | F | 1.7 | 1.8 | 0.4 | 2.0 | 4.0 | 1.8 | 1.8 | 12 | 1 | 3 | 5 | 2 | 1 | 664 |
| Findings interpreted as female genital | F | 1.5 | 1.5 | 0.5 | 2.7 | 2.5 | 0.9 | 1.8 | 10 | 1 | 4 | 3 | 1 | 1 | 648 |
| Renal ptosis | M | 0.5 | 0.6 | 0.3 | | 0.9 | | | 3 | 1 | 0 | 2 | 0 | 0 | 525 |
| | F | 2.0 | 2.0 | 0.3 | | 6.4 | 3.7 | 2.2 | 11 | 0 | 1 | 6 | 3 | 1 | 558 |
| Hernia, all forms | M | 7.2 | 8.5 | 3.6 | | 7.6 | 29.8 | | | | | | | | |
| | F | 1.7 | 2.0 | 0.7 | | 0.8 | 5.5 | | | | | | | | |
| Hernia, inguinal | M | 6.1 | 7.4 | 2.6 | | 6.5 | 28.2 | 21 | 4 | 0 | 0 | 6 | 11 | 283 | |
| | F | 0.9 | 1.0 | 0.4 | | — | 3.0 | 4 | 0 | 1 | 0 | 3 | 0 | 385 | |
| Other hernia | M | — | 1.1 | 1.0 | | 1.1 | 1.6 | 6 | 3 | 0 | 1 | 1 | 1 | 554 | |
| | F | — | 0.9 | 0.3 | | 0.8 | 2.5 | 6 | 1 | 0 | 1 | 2 | 2 | 648 | |
| Male Genital | | | | | | | | | | | | | | | |
| Hydrocele | M | 2.8 | 3.2 | 0.7 | | 4.0 | 7.1 | 7.7 | 9 | 1 | 0 | 2 | 3 | 3 | 283 |
| Varicocele | M | 7.4 | 8.1 | 2.0 | | 10.0 | 26.2 | 10.3 | 23 | 0 | 3 | 5 | 11 | 4 | 283 |
| Other genital | M | 5.7 | 5.6 | 7.6 | 5.0 | 4.0 | 4.9 | | 16 | 7 | 3 | 2 | 4 | 0 | 283 |
| Spine | | | | | | | | | | | | | | | |
| Kyphosis and scoliosis | M | 6.4 | 7.0 | 1.2 | 4.7 | 8.1 | 12.0 | 19.3 | 33 | 2 | 4 | 7 | 9 | 11 | 471 |
| | F | 7.2 | 7.8 | 1.7 | 4.8 | 12.4 | 8.2 | 29.2 | 42 | 3 | 6 | 12 | 7 | 14 | 536 |
| Other spine | M | 1.9 | 2.1 | — | 0.4 | 3.5 | 5.3 | 3.5 | 10 | 0 | 1 | 3 | 4 | 2 | 471 |
| | F | 2.0 | 2.2 | — | — | 6.2 | 4.7 | 4.2 | 12 | 0 | 0 | 6 | 4 | 2 | 536 |
| Extremities | | | | | | | | | | | | | | | |
| Flat foot and foot strain | M | 3.1 | 3.7 | 0.9 | 1.5 | 3.8 | 5.9 | 10.4 | 12 | 1 | 1 | 2 | 3 | 5 | 324 |
| | F | 2.2 | 2.4 | 0.9 | | 4.7 | 5.1 | 2.5 | 9 | 2 | 0 | 3 | 3 | 1 | 382 |
| Varicose veins | M | 2.5 | 3.1 | — | 0.9 | 7.8 | 8.3 | | 10 | 0 | 0 | 2 | 4 | 4 | 324 |
| | F | 5.7 | 6.8 | — | 1.8 | 23.7 | 17.5 | 26 | 0 | 0 | 5 | 14 | 7 | 7 | 382 |
| Arthritis, all forms | M | 3.9 | 4.9 | 1.2 | | 1.9 | 9.8 | 16.7 | 16 | 0 | 2 | 1 | 5 | 8 | 324 |
| | F | 3.3 | 3.9 | 0.5 | | 6.2 | 5.1 | 17.5 | 15 | 1 | 0 | 4 | 3 | 7 | 382 |
| Arthritis, hypertrophic or atrophic only | M | 2.1 | 2.8 | — | — | 1.1 | 12.5 | | 9 | 0 | 0 | 0 | 3 | 6 | 324 |
| | F | 2.8 | 3.4 | 0.5 | | 4.7 | 5.1 | 15.0 | 13 | 1 | 0 | 3 | 3 | 6 | 382 |
| Injuries | M | 6.0 | 6.5 | 3.5 | | 7.5 | 13.7 | 8.3 | 21 | 0 | 6 | 4 | 7 | 4 | 324 |
| | F | 0.5 | 0.5 | — | 0.4 | — | 1.0 | | 2 | 0 | 0 | 1 | 0 | 1 | 382 |
| Other extremities | M | 2.4 | 2.8 | 0.6 | | 5.7 | 3.9 | 6.2 | 9 | 0 | 1 | 3 | 2 | 3 | 324 |
| | F | 1.4 | 1.6 | 0.8 | 1.2 | 1.6 | 3.0 | | 6 | 1 | 1 | 1 | 0 | 3 | 382 |
| Central Nervous System | | | | | | | | | | | | | | | |
| All organic findings | M | 1.8 | 1.6 | 0.4 | 3.2 | 1.0 | 2.3 | 3.2 | 9 | 1 | 3 | 1 | 2 | 2 | 560 |
| | F | 0.6 | 0.6 | 0.3 | | 0.8 | 0.9 | 1.8 | 4 | 0 | 1 | 1 | 1 | 1 | 664 |
| Skin | | | | | | | | | | | | | | | |
| All dermatological findings | M | 11.5 | 12.2 | 8.1 | 12.3 | 13.2 | 9.8 | 22.4 | 40 | 9 | 8 | 7 | 5 | 11 | 329 |
| | F | 11.6 | 12.0 | 10.6 | 10.2 | 10.9 | 13.6 | 20.0 | 46 | 14 | 9 | 7 | 8 | 8 | 383 |
| Laboratory (Urinalysis) | | | | | | | | | | | | | | | |
| Albumin (all degrees) | M | 2.2 | 2.5 | 1.5 | 2.4 | 0.6 | 10.0 | | 11 | 2 | 2 | 0 | 1 | 6 | 443 |
| | F | 5.4 | 5.4 | 7.4 | 3.3 | 3.9 | 7.1 | 3.8 | 28 | 11 | 4 | 4 | 7 | 2 | 523 |
| Glycosuria (all degrees) | M | 3.6 | 4.1 | 0.8 | 3.6 | 6.8 | 7.3 | 3.3 | 18 | 1 | 3 | 6 | 6 | 2 | 443 |
| | F | 4.9 | 5.7 | 2.7 | 1.6 | 6.9 | 9.2 | 15.1 | 30 | 4 | 2 | 7 | 9 | 8 | 523 |
| Glycosuria (1 per cent or more) | M | — | 0.2 | — | — | — | 0.7 | | 1 | 0 | 0 | 0 | 1 | 0 | 443 |
| | F | — | 2.5 | — | 0.8 | — | 6.1 | 7.5 | 13 | 0 | 0 | 3 | 6 | 4 | 523 |
| Sediment, white cells numerous | M | 2.3 | 2.3 | 2.3 | | 2.3 | 1.2 | 3.3 | 10 | 0 | 5 | 2 | 1 | 2 | 443 |
| | F | 6.1 | 6.3 | 6.7 | 1.6 | 9.8 | 10.2 | 1.9 | 33 | 10 | 2 | 10 | 10 | 1 | 523 |
| General conditions | | | | | | | | | | | | | | | |
| Arteriosclerosis | M | — | 6.1 | — | — | 1.0 | 4.6 | 46.0 | 34 | 0 | 0 | 1 | 4 | 29 | 560 |
| | F | — | 3.6 | — | — | — | 3.7 | 36.4 | 24 | 0 | 0 | 0 | 4 | 20 | 664 |
| Nephritis, acute and chronic | M | 1.5 | 1.8 | 0.8 | 1.2 | 0.6 | 8.3 | | 8 | 1 | 1 | 0 | 1 | 5 | 443 |
| | F | 1.6 | 1.7 | 1.1 | — | 2.0 | 2.0 | 3.8 | 9 | 3 | 0 | 2 | 2 | 2 | 523 |
| Diabetes | M | 0.6 | 0.7 | 0.8 | — | 0.4 | 1.7 | | 3 | 1 | 0 | 0 | 1 | 1 | 443 |
| | F | 1.8 | 2.3 | 0.4 | | 2.9 | 5.1 | 5.7 | 12 | 1 | 0 | 3 | 5 | 3 | 523 |
| Anemia | M | — | 0.7 | — | — | — | 2.3 | 1.6 | 4 | 1 | 0 | 0 | 2 | 1 | 560 |
| | F | — | 1.4 | 0.4 | 2.0 | 1.6 | 1.8 | | 9 | 1 | 3 | 2 | 3 | 0 | 664 |
| Syphilis, clinically evident | M | — | — | — | — | — | — | — | 1 | 0 | 0 | 0 | 0 | 1 | 385 |
| | F | — | — | — | — | — | — | — | 3 | 1 | 1 | 0 | 1 | 0 | 385 |
| Cancer | M | — | 0.4 | — | — | — | — | 3.2 | 2 | 0 | 0 | 0 | 0 | 2 | 560 |
| | F | — | 0.4 | 0.3 | — | 0.4 | 1.8 | | 3 | 0 | 1 | 0 | 1 | 1 | 664 |

¹ Standardized to rural white population, United States Census, 1930. Each sex was standardized to the age distribution of the corresponding sex; the age distribution in the two sexes showed very slight differences.

² Children 0-4 years of age have not been included.

³ The male and female rates here were obtained by addition of the rates for inguinal hernia and other hernia computed from different population bases.

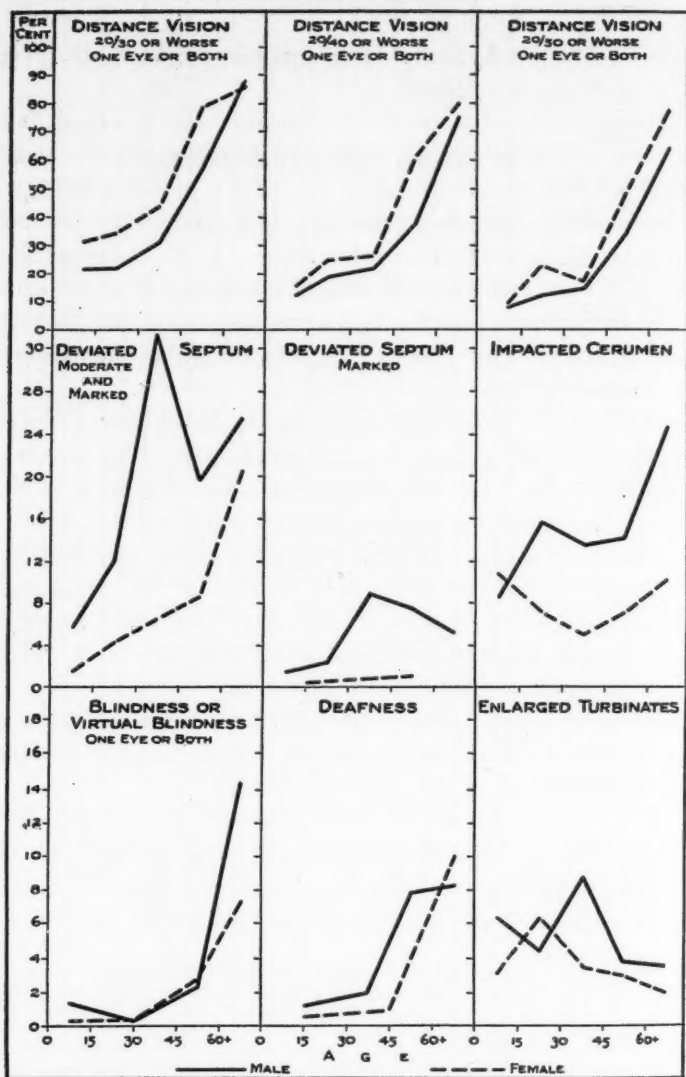


Fig. 4. Percentages of males and of females with specified impairments at different ages; total sample.

These data reveal relatively few variations of note in the prevalence of *enlarged turbinates*.

The prevalence of *pyorrhea and gingivitis* bears a fairly definite relation to both age and sex, as shown in Figure 5. The downward trend of both curves in the later years of life is probably due to the relatively large number of persons at older ages whose teeth have been lost. The lower figures for females may be due to better habits of oral hygiene rather than to intrinsic sex differences in incidence. The Life Extension Institute study shows very similar data for these two conditions (given, however, separately) within the narrower age range considered.

The curves for *dental caries* of all degrees show high proportions at ages under fifteen years. This is in part because of the neglect of deciduous teeth which are being replaced during most of this period. The curve for females then declines progressively while that for males reaches a maximum in the age group 30-44 and then declines. The difference in the behavior of these two curves probably is traceable to a number of factors some of which would be differences in number of teeth lost and in care of the teeth, including both home and professional dental care.⁸

Extensive dental caries as indicated by the discovery of five or more cavities is apparently much less common in this area and considerably less dependent upon age and sex.

The data showing one or both sets of *teeth lost* are of no little interest. The prevalence here increases quite rapidly with age, but at least the most general category of tooth-loss shows no sex differences. This similarity between male and female rates persists

⁸In connection with professional dental care, fillings and inlays were enumerated but have not been included in the caries analysis for obvious reasons unless there was evidence of caries about the filled cavity. At ages 15-29 a higher proportion of females showed dental care of this sort than of males, the proportions being 66.4 and 55.0 per cent. A more exact measure of the prevalence of caries would include as caries not only present cavities but fillings, inlays, and extractions, the great majority of the latter in this area having been for extensive caries of teeth. Data of this sort would give a better indication of the prevalence of dental caries although it would not reveal the prevalence of existing impairments which the present data are designed to show.

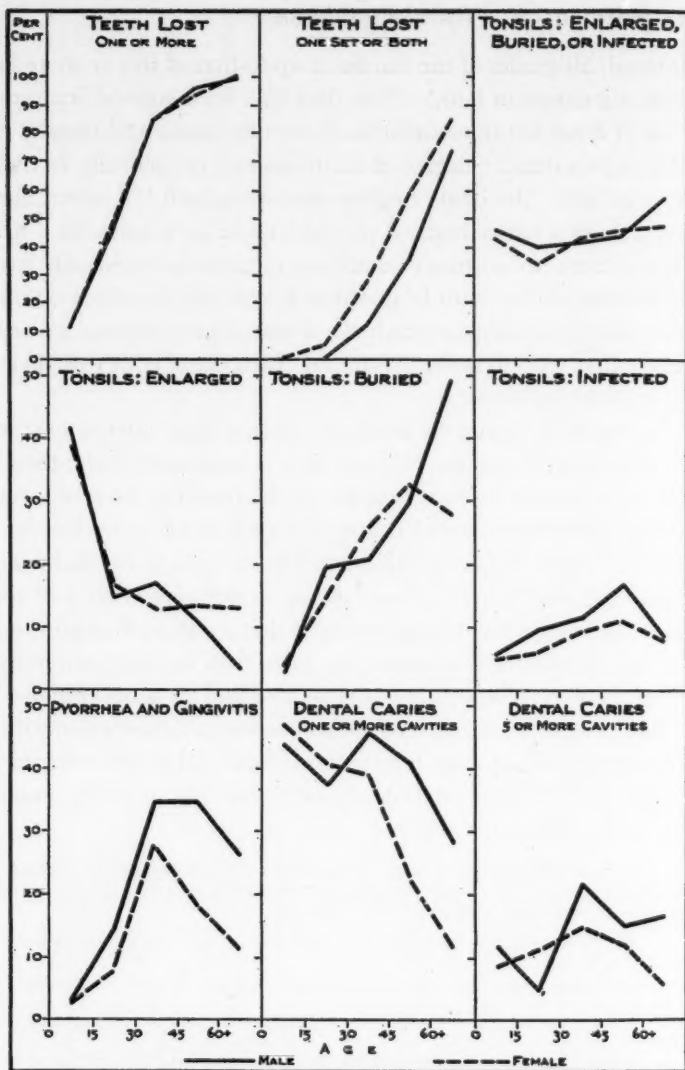


Fig. 5. Percentages of males and of females with specified impairments at different ages; total sample.

through all grades of the condition up to that of five or more lost (but not one set or both). These data have been omitted because of lack of space but the standardized rates for males and females for this more extensive degree of tooth-loss are, respectively, 15.1 and 12.0 per cent. The final category—one set or both lost—does, however, show a rather marked preponderance in females. In a field where there are so many complicating factors, conclusions from these limited data must be guarded, but the implication is definite that when tooth-loss has reached a certain degree, women are more prone than men to resort to removal of one set or both with a view to artificial replacements.

Tonsillar data may be controversial but those offered here are in some respects unique, showing first in combination and then in detail a uniform medical opinion on the tonsillar status of a relatively unselected population covering a whole life span. It is quite true that there might be differences in the size of the individual rates with different examiners owing to different criteria of tonsillar pathology, but it seems probable that the general trend would be very similar to that shown by these data for any community where, as here, relatively few persons have had the tonsils removed.⁹

The prevalence of *enlarged, buried, or diseased tonsils* shows little relationship to age or sex but the individual conditions combined in these curves show very definite relationships to age with the possible exception of *infected* tonsils.

⁹ The present study is primarily one of impairment with less emphasis upon correction; however, the data on removal of tonsils have some bearing upon the prevalence of tonsillar impairment and may therefore be included here.

By age and sex, number and per cent of examined persons whose tonsils have been removed.

| SEX | ALL AGES CRUDE | RATES, PER CENT | | | | | NUMBER | | | | | |
|-----|-------------------|-----------------|-------|-------|-------|-----|-------------------|------|-------|-------|-------|-----|
| | | 0-14 | 15-29 | 30-44 | 45-59 | 60+ | Total All Ages | 0-14 | 15-29 | 30-44 | 45-59 | 60+ |
| M | 9.3 | 12.4 | 14.9 | 7.3 | 2.4 | 3.3 | 51 | 26 | 14 | 7 | 2 | 2 |
| F | 12.7 | 6.8 | 27.0 | 15.2 | 0.9 | 7.3 | 79 | 15 | 40 | 19 | 1 | 4 |

Had numbers been sufficient to permit a more detailed analysis of the 0-14 year age group in the case of both dental caries and enlarged tonsils, the prevalence of both conditions would of course be very low at the earliest ages of life, rising rapidly thereafter. Detailed data for enlarged tonsils have been assembled for the life span by Collins,¹⁰ showing that the highest prevalence occurs between the ages of five and ten years.

The prevalence of *thyroid enlargement* increases with age and shows a very marked excess among females, one of the most outstanding sex differences in the whole series. *Diffuse enlargement* is seen to make up about half the total number of cases. A noteworthy difference between these findings and those of the Life Extension Institute study is that the trend is consistently downward in the latter with increasing age.

It may be recalled that chronic myocarditis comprises the bulk of the cases of *heart disease, all forms*, so that the curves for this inclusive category show rather an abrupt rise at the older ages. As most of the cases of myocarditis were incipient, the true sample incidence does not show marked differences when compared to that of the total sample for all forms of heart disease. There were, however, only three cases with *valvular and congenital heart trouble* in the true sample so that the true prevalence of these conditions may be considerably lower than the total sample data indicate.

Comparative data on heart defects are quite abundant but largely based upon urban populations. The data of the Heart Council of Greater Cincinnati¹¹ covers the ages of fifteen years and over for males in various occupational groups and offers prevalence data

¹⁰ Collins, Selwyn D.: An Epidemiological and Statistical Study of Tonsillitis. *Public Health Bulletin* No. 175, United States Public Health Service, July, 1927. On page 51 the observed incidence of enlarged tonsils through the entire life span is shown graphically, and while the rates do not accord entirely with those shown here, the general trend is well indicated.

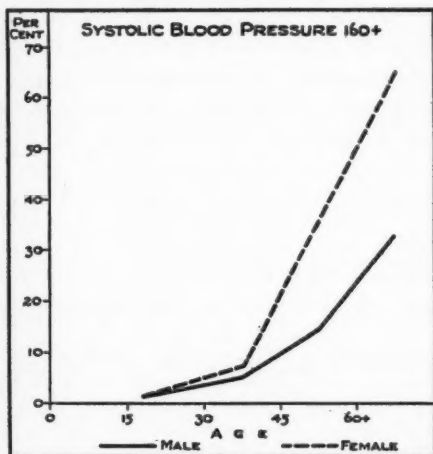
¹¹ Life Conservation Studies I, II and III, published by the Heart Council of Greater Cincinnati, 312 West Ninth Street. These studies deal with physical impairment among: (i) 1,000 white male office workers, (ii) 1,000 white male machine and hand-tool operators, and (iii) 1,000 colored male factory workers.

for many other conditions as well. The cardiac findings agree in trend for those of males in the present study but tend to show uniformly higher prevalence.

Early in life organic heart defects are predominantly valvular or congenital in character and comparable data are not easily found. Goodman and Prescott¹² have reported prevalence among a group of New York City children at 0.57 per cent, and add to that an estimated number of children unable to come for examination, bringing the total prevalence to 0.9 per cent. It seems probable that the prevalence would be somewhat lower at these ages in the present study because acute rheumatic fever, as a cause of valvular heart disease, was relatively uncommon.

The curves for *systolic blood pressure* of 160 or over are shown separately in Figure 6 and disclose apparently definite relationships to both age and sex. The hypothesis at once suggests itself that,

Fig. 6. Percentages of males and of females with systolic blood pressure of 160 mm. or more at different ages; total sample.



these figures being based largely upon one observation only, the excess female rates are due to greater apprehensiveness on the part of women undergoing examination and to a resulting artificial increase in blood pressure. While this possibility cannot be excluded, the limited data from retesting blood pressures in this group indicate that the male and not the female

¹² Goodman, Morris and Prescott, Josephine W.: Heart Disease among Adolescent School Children of New York City. *Journal of the American Medical Association*, July 21, 1934, ciii, pp. 157-161. The data are for children between 14 and 17 years of age applying for working papers.

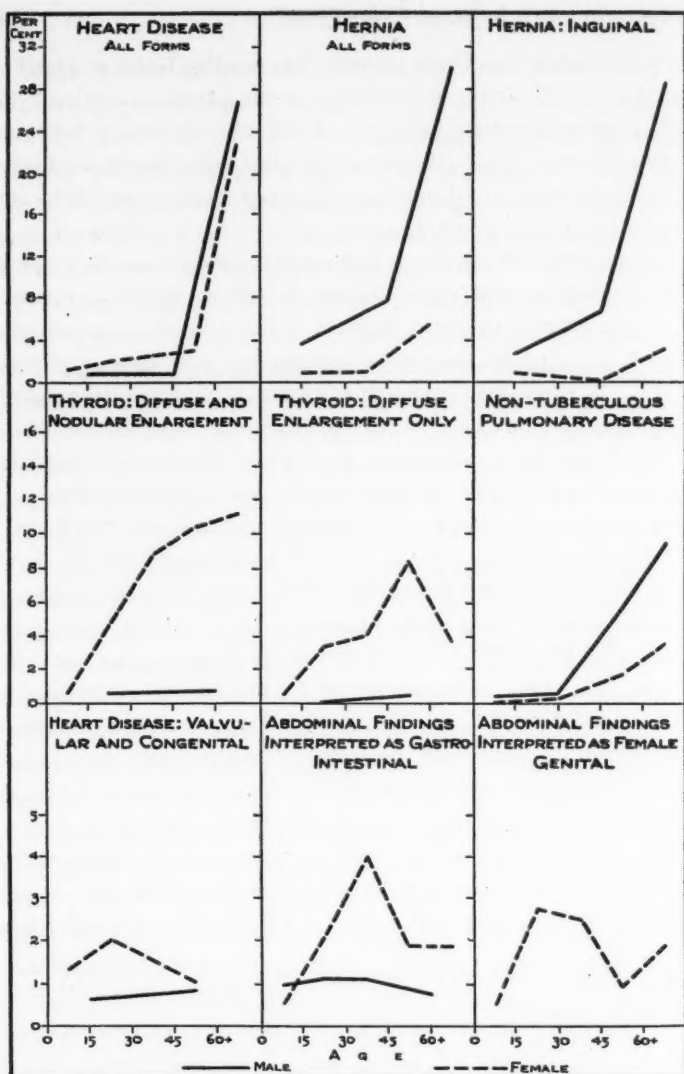


Fig. 7. Percentages of males and of females with specified impairments at different ages; total sample.

showed instability of blood pressure.¹³ A possible factor in producing the sex difference shown here is the greater prevalence of obesity among females of this area. A definite relationship between systolic blood pressure and overweight has been shown for males by Britten¹⁴ and would appear to be even more pronounced for females in the present data.¹⁵

The findings for *nontuberculous pulmonary disease* were quite limited at the younger ages and the differences which appear between the sexes at the older ages are rather difficult to evaluate in view of the smaller numbers examined at these ages. The true sample cases comprise only four of the eighteen cases in the total sample, and it seems probable that in this group, as in that of valvular and congenital heart disease, the true prevalence is considerably lower than is shown by the total sample figures here presented.

The *abdominal findings*, both gastro-intestinal and *female genital*, are not easily interpreted. The differentiation between these two cannot be satisfactorily made, and it is possible that the excess which appears for the former may in part be due to conditions which may properly belong to the latter. In both, also, the true sample data show considerably lower prevalence, suggesting a packing of the total sample due to apprehension about symptoms. The caution has been made above but bears repetition—that actual organic findings do not tell the whole story of impairments where, as in the abdomen, so many are of a functional character.

The prevalence of *renal ptosis* shows a very definite female preponderance after the early years of life, but the significance of the decline in the later years is not clear. A history of treatment for this

¹³ Of fourteen females retested, seven showed an average increase of 8 mm.; three showed no change, and four an average decrease of 13 mm. Of six males retested, one showed an increase of 5 mm. while five showed an average decrease of 38 mm.

¹⁴ Britten, Rollo H.: Physical Impairment and Weight. *Public Health Reports*, United States Public Health Service, August 4, 1933, 48, No. 31, pp. 926-944.

¹⁵ A more extended study of this subject is planned, but the preliminary analysis shows that, at ages under sixty years, females 20 per cent or more overweight have systolic blood pressures 160 mm. or more far more frequently than those with lower degrees of overweight or with underweight.

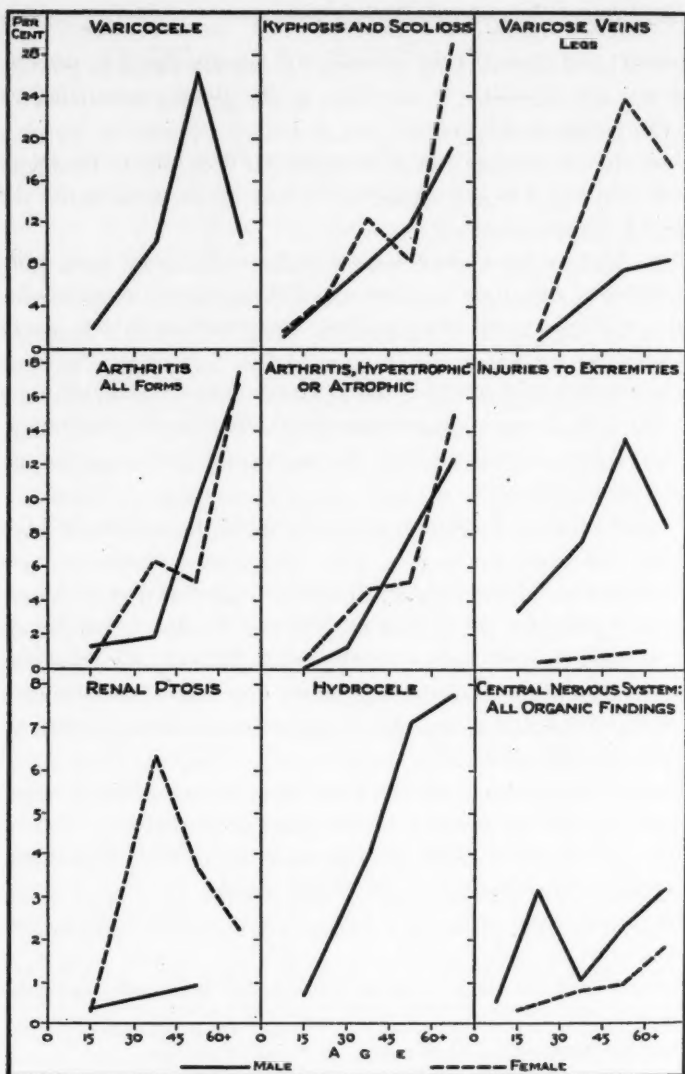


Fig. 8. Percentages of males and of females with specified impairments at different ages; total sample.

condition was decidedly uncommon, and it is possible that identification of renal ptosis was less exact in these later years owing to the prevalence of obesity.

The occurrence of *hernia, all forms*, bears a definite relationship to age and sex. The greater part of the excess in males is due to *inguinal hernia* which was encountered occasionally in women but very frequently in males, particularly at the older ages. The prevalence of hernia, other than inguinal, was much more nearly uniform between the two sexes but cases were too few to show reliable rates.

The prevalence of *hydrocele* bears a more definite relationship to age than that of *varicocele*, but these data were from the population examined by one examiner only and variations in the last age group have little significance.

The prevalence of *kyphosis and scoliosis* of the spine is related primarily to age.

The data for *flat foot and foot strain* show a gradual rise with age, but no sex differences of definite significance. Women, it was noted, used arch supports far more frequently than men, and it is probable that this reduced the number of complaints as to the present status of foot trouble, equalizing what might otherwise have been a genuine sex difference.

The prevalence of *varicose veins* in the leg bears a definite relationship to age and shows a very definite excess among females. The Life Extension Institute findings agree quite closely with those presented here, not only in degree but in trend.

The curves for *arthritis, all forms*, are very similar to those for *hypertrophic or atrophic arthritis*, of which the former is largely composed. In both, the relationship to age is clear and no sex differences appear. The trend of these curves bears some resemblance to that for kyphosis and scoliosis, and, had there been the X-ray basis for diagnosis which the spinal conditions had, the degree of these latter might have been equalled or exceeded, as well.

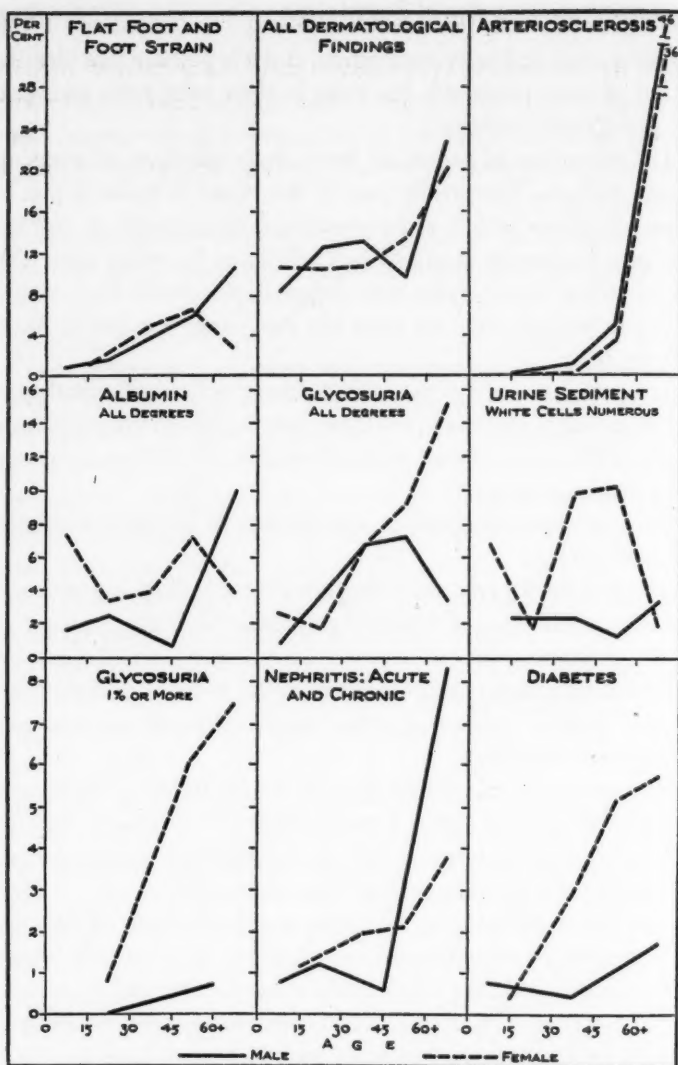


Fig. 9. Percentages of males and of females with specified impairments at different ages; total sample.

The data for *injuries to extremities* show one of the most definite excesses for males in the series. The injuries among men were, for the most part, sustained in the course of heavy manual labor or hunting while those for women were the consequence of falls in and about the home.

The limited data on *organic findings of the central nervous system* do not permit of close analysis, although some significance may be attached to the consistent excess in males.

The findings for all *dermatological conditions* show very little in either trend or sex variation. The individual skin impairments, of which these rates are formed, have individual age, and in some cases sex differences which are of course concealed in the general curve.

The laboratory urinalysis data must be considered as isolated observations with only the value that attaches to an objective finding not wholly free from error. The age trends are not readily discernible except in *glycosuria*, 1 per cent or more, and the sex differences are of debatable significance, also with the exception of this last.

The two most important diagnoses dependent upon the urinalysis are *nephritis* and *diabetes*, listed in Table 8 under "General Conditions." The figures for the prevalence of nephritis approximate those for individuals showing albumin only in the oldest age group, the impairment status of the others with albuminuria remaining uncertain. The prevalence of diabetes, however, does closely approximate that of glycosuria, 1 per cent or more, there being slight differences due to the fact that a few individuals with this degree of urinary sugar were found not to have diabetes, and a few known to have the disease either had no urinalysis report or, receiving insulin, showed no sugar. Undoubtedly, a number of individuals with amounts of glycosuria under 1 per cent would have been found to have either low-grade or incipient diabetes, had this group been studied with as much care as those showing the

more significant amounts. The very definite excess for females at the older ages is not easily understood in view of the commonly expressed opinion that diabetes is more prevalent in males. It does, however, accord with the distribution of overweight or obesity, a condition which is often associated with the diabetes of later life.

A quite inexplicable fact is that, with only two exceptions, all the diabetics are in the true sample. Such a distribution weakens somewhat the basis for considering the true sample a relatively unselected group. However, this is the only one of the more serious impairments which shows such an extreme distribution.

The only other general condition permitting of individual study by age and sex is *arteriosclerosis*. This finding is seen to be very definitely limited to the older ages and to show a male preponderance which is not striking but is quite uniform. It may, however, legitimately be questioned whether this excess in males is an actual one or whether it can be attributed to the greater difficulty of making observations upon the superficial arteries of females because of the more common occurrence of adiposity. The prevalence of "arterial thickening" in the Life Extension Institute series is higher at the younger ages of adult life and does not reveal the consistent excess in males that these data show.

DISCUSSION

In general, the prevalence of conditions for which data have been presented above tends to increase with age, although the rate of increase may vary markedly. A limited number (and upon close inspection they are usually found to be groups of conditions) show no marked variation with respect to age. These are history of frequent or prolonged coughs or colds, history of chronic or recurring skin trouble, enlarged turbinates, tonsils (enlarged, buried, or infected), valvular and congenital heart disease, and dermatological findings. In one instance, the tonsil group, it was possible to show rates for the individual components, and when this was done rather striking age relationships appeared.

A still more limited number of conditions were found to *decrease* in prevalence with age. This was true of enlarged tonsils and dental caries, especially in females. Had there been sufficient numbers of cases to make a separate study of the prevalence of more of the conditions in grouped categories, notably of congenital heart disease, further instances might have been found.

A final type of variation with age is shown by history of headache, psychoneurosis, diseases of women, lumbago and backache, and by pyorrhea and gingivitis. Here the conditions rise to a maximum in middle life and decline again at the older ages.

These variations with age are in general well recognized in morbidity literature, but the extent to which conditions may be found at various ages is not so definitely established, particularly for rural populations.

Sex differences are a somewhat more difficult field to analyze. In the present data consistent and often significant excess rates appear for males in history of bronchitis, impacted cerumen, deviated septum, pyorrhea and gingivitis, dental caries, nontuberculous pulmonary disease, inguinal hernia, injuries to extremities, and arteriosclerosis. Reasons have been given above, however, for regarding the excess in the case of dental findings (pyorrhea and gingivitis, and caries), and possibly also in septal deviations and arteriosclerosis, as inconclusive or only indirectly related to sex.

Excess rates for females were found for most of the leading symptoms for the history diagnosis of psychoneurosis, for overweight, defective distance vision, one or both sets of teeth lost, thyroid defects, high blood pressure, renal ptosis, varicose veins of legs, and for the higher degrees of glycosuria as well as for diabetes.

In the discussion of these subjects it was pointed out that there were possible objections to the view that the leading symptoms, higher grades of tooth-loss and high blood pressure, were actually more prevalent among females, although the collateral data lend some support to the findings in the case of high blood pressure.

ANNOTATIONS

TWENTY-FIVE YEARS OF HEALTH PROGRESS

THE mortality experience among the industrial policy-holders of the Metropolitan Life Insurance Company has earned a unique position in the vital statistics of this country and Canada. The ranking achievements of the Company in this field, now of proven worth to commercial enterprise as well as to the American public in general, is a tribute to the extraordinary statistical organization under the able leadership of Dr. Louis I. Dublin. There is a striking similarity in the approaches of Dr. Dublin in utilizing the vital experience of the huge population segment of an American nonofficial agency and the methods of Dr. Farr's classical work in the field of official vital statistics in England. Both have broadened immensely our knowledge of the forces of mortality affecting the wage-earning population and the value of Dr. Dublin's contribution for this country is enhanced by the fact that nation-wide vital statistics in the United States are scarcely five years old.

TWENTY-FIVE YEARS OF HEALTH PROGRESS,¹ by Dr. Louis I. Dublin and Dr. Alfred J. Lotka, presents a statistical study of the mortality experience of the industrial policy-holders of the Metropolitan Life Insurance Company for the period 1911-1935. The material is thoroughly and scientifically treated and readably presented. The scientific value of such a study depends, among other things, upon the length of the period covered by the statistics and the comparability of the data throughout the period under consideration. One of the most difficult problems in securing comparability of data throughout a period covering a quarter of a century is the changes in classification from decade to decade that occur in the "International List of Causes of Death." In the publication

¹ Louis I. Dublin, Ph.D. and Alfred J. Lotka, D.Sc.: TWENTY-FIVE YEARS OF HEALTH PROGRESS: A Study of the Mortality Experience Among the Industrial Policy-Holders of the Metropolitan Life Insurance Company 1911 to 1935. New York, N. Y., Metropolitan Life Insurance Company, 1937. 611 pp.

under review the difficulty has been overcome wherever consistent and possible, by using the 1920 classification as a basis and by re-sorting titles wherever necessary to make them conform as nearly as could be with the 1920 list.

The first three chapters of *TWENTY-FIVE YEARS OF HEALTH PROGRESS* are devoted to general considerations. In Chapter 1 there is included a discussion of the demographic characteristics of the population under consideration. In brief, the experience relates to an insured population, 1-74 years of age, which increases from eight million persons in 1911 to seventeen million in 1935. These persons live in the United States and Canada, largely in urban communities and in widely different geographical areas. Including as it does principally the wage-earning population and their families, the experience has fewer employed males in the professional and semi-professional population than there are in the general population. On the other hand, there are relatively more persons classified under the heading of "Manufacturing and Mechanical Industries," transportation services, and public service occupations and, to a lesser degree, under trade, domestic and personal service, and clerical occupations. The economic status is, therefore, on the whole lower than that of the general population.

There are distinct differences between the distribution by age, sex, and color of the industrial policy-holders and of the general population of the United States. These differences are in the gross: (1) a considerable excess of females; (2) a larger proportion of young persons; and (3) an excess of colored persons, due entirely to a greater proportion of colored females. In order to adjust for these differences as well as to make the experience comparable throughout the period, standardized death rates are used in the discussion. The Standard Million Population of England and Wales is adopted in the case of death rates for white persons, colored persons and the entire group; special weights are applied to the standardized death rates for color and sex in order to secure such death rates for both sexes combined and for all persons. The other two introductory chapters in this volume deal with the general mortality from all causes and the trend of longevity throughout the period covered by the study.

The nine chapters that follow are actually distinct sections arranged into several chapters. Each section is devoted to detailed consideration of a group of causes of death as a whole and of the specific diseases operating

in the group. Although the treatment of these chapters is somewhat similar in content and order of presentation, namely the mortality for each cause by age, sex, and color, the trend of mortality during the period, special factors in the increase or decrease of the death rate, and the prevention of deaths in the future, yet the style of the authors is never stereotyped or boring. Throughout the discussion, data from other sources have been generously drawn upon from time to time in order to afford the reader a broader presentation of the subject and to assist him in the interpretation of the findings of the experience of the authors. In the chapter on influenza and pneumonia, there is a special essay on the epidemic of influenza of 1918 and 1919 in the United States.

The final discussion of the book, Chapter XII, deals with deaths from external causes and contains considerable data on fatal accidents that have not been generally available previously except for a limited number of states. There is given in Table 7, on page 439, the percentage distribution of accidental deaths by origin of hazard (home, public, occupational); in Table 11, on page 452, automobile deaths by type of accident; in Table 18, on page 473, the percentage of deaths from falls according to agency of fall; and in Table 22, on page 484, the percentage of deaths from burns according to agency of injury. If in computing the percentages in Table 11, 18, and 22 unspecified returns were excluded, the reviewer believes that the percentage distributions would have more extensive applicability.

The source of the facts upon which the volume is based made it impossible for the authors to present in Chapter X an entirely satisfying treatment of diseases of the puerperal state. The difficulty lies in the lack of information concerning births among the population at risk upon which to base the usual rates of maternal mortality. This chapter might well have contained a discussion of the relative importance of deaths from puerperal causes for women of childbearing ages.

The volume has two appendices: Appendix 1 discusses briefly the methods of compilation and analysis of data used in the report. Appendix 2 consists of four very valuable tables containing the detailed figures discussed in the report. The first of these tables gives the number of deaths and death rates for each cause from which the population at risk in each instance can be determined. The remaining tables contain standardized and specific death rates by age, sex, and color, for each cause for each year of the experience.

Taking the publication as a whole, the treatment has been such that for the first time there is available in a single volume the trend of mortality by specific causes over a relatively long period of time for a large portion of the population of this country and a comparison of the color, sex, and age specific death rates for two widely separated quinquennia, namely, 1911-1915 and 1931-1935. Workers in public health and others are indeed in debt to the Metropolitan Life Insurance Company and the authors for a book of splendid source material as well as for a valuable discussion of present mortality trends.

W. THURBER FALES, SC.D.

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BIRTH CONTROL AND THE PUBLIC HEALTH

THE status of birth control in the United States has undergone a marked change in the past year and a half. The decision of the United States Court of Appeals in December, 1936, and the action of the House of Delegates of the American Medical Association in June, 1937, paved the way for the prescription of contraceptives by physicians as a legally and medically approved service in preventive medicine. The majority opinion in the Court of Appeals decision ruled that the design of the present Act "is not to prevent the importation, sale or carriage by mail of things which might intelligently be employed by conscientious and competent physicians for the purpose of saving life or promoting the well-being of patients."¹ The recommendations of the Committee on Contraceptive Practices and Related Problems, which were accepted by the American Medical Association, follow:

1. That the American Medical Association . . . make clear to physicians their legal rights in the use of contraceptives.
2. That the American Medical Association undertake the investigation of materials, devices and methods . . . employed for the prevention of conception . . . and that the results of such investigations be published for the information of the medical profession.
3. That the Council on Medical Education and Hospitals of the American Medical Association be requested to promote thorough in-

¹ *New York Times*, December 8, 1936.

struction in medical schools with respect to . . . the positive and negative aspects of fertility and sterility.²

Official recognition of birth control has been followed by several popular articles which reflect a widespread interest in the subject. In March, 1938, the *Ladies' Home Journal*³ published the results of a nation-wide sampling survey poll among American women, 79 per cent of whom stated that they "were in favor of birth control." The reasons most frequently given were economic, but 40 per cent of the women who approved of birth control gave health reasons for so doing. These reasons included the mother's health, the spacing of children, and the prevention of the birth of defectives.

Fortune, in an article on the commercial distribution of contraceptives,⁴ editorially approved by the *Journal of the American Medical Association*,⁵ exposes the flagrant lack of ethics in this commercial field. There are no standards of quality or effectiveness. Millions of dollars worth of ineffective, and sometimes harmful, contraceptives are being marketed through druggists, house-to-house canvassers, slot-machines, and gasoline stations, to a public which knows no better means of limiting its families. The need for legal measures to establish standards is obvious, and the author of the article places responsibility for the regulation of the production and sale of contraceptives on the medical profession.

The public demand for contraceptives places a double burden on the medical profession: the responsibility of preventing the commercial distribution of contraceptives which are harmful and ineffective, and the responsibility of prescribing contraceptives for all cases in which pregnancy is temporarily or permanently contraindicated for health reasons.

The importance of giving specific contraceptive advice in cases in which pregnancy is contraindicated is readily apparent. The mother with tuberculosis or heart disease, who is told to have no more children, is forced to accept the commercially distributed contraceptive which is

² Report of the Committee to Study Contraceptive Practices and Related Problems. *Journal of the American Medical Association*, June 26, 1937, cviii, No. 26, p. 2217.

³ Pringle, Henry F.: What Do the Women of America Think about Birth Control? *Ladies' Home Journal*, March, 1938, p. 14.

⁴ The Accident of Birth. *Fortune*, February, 1938, p. 83.

⁵ The Business of Birth Control. *Journal of the American Medical Association*, February 12, 1938, cx, No. 7, p. 513.

easiest of access, regardless of its quality or effectiveness, unless her physician prescribes one for her. The patients of private physicians usually receive this service. Unless contraception is accepted as a recognized public health procedure and all physicians are trained in techniques of contraception, the service is not readily available to couples who cannot afford to consult a specially trained private physician. In many cases these are the families in which the combined pressure of inadequate income, malnutrition, illness, and many children makes the need most acute.

Physicians and public health nurses realize the acuteness of the need. Representatives of both groups, meeting with the American Eugenics Society,⁶ agreed that an ideal maternal health service should include marriage counselling, the treatment of sterility, and the prescription of contraception "for the health benefit of mother and children . . . through government agencies of medical service, when necessary."⁷ About fifty city and county health departments have already recognized the need for publicly supported contraceptive clinics, and the number of such clinics under the direct supervision of local health authorities is increasing.

The ready availability of medically supervised contraceptive services should be an important factor in reducing maternal morbidity and mortality, both from diseases which pregnancy makes more dangerous, and from abortion. Dr. C.-E. A. Winslow summarizes the situation admirably in a recent issue of the *Birth Control Review*. He concludes that: "It must be a clear and obvious health responsibility of every intelligently governed community in the future to provide marital counsel, including contraceptive instruction where indicated, to all those who are not in a position to obtain such counsel through a properly informed family physician or specialist."⁸

REGINE K. STIX, M.D.

⁶ Conferences on the Relation of Eugenics to the Fields of Recreation, Nursing, Education and Medicine. New York City, American Eugenics Society, May, 1937, pp. 16-19, 29-37.

⁷ Emerson, Haven: Eugenics in Relation to Medicine. *Marriage Hygiene*, August, 1937, iv, No. 1, p. 11.

⁸ Winslow, C.-E. A.: Birth Control as a Public Health Problem. *Birth Control Review*, December-January, 1937-1938, xxii, Nos. 3 and 4, p. 33.

BIRTH ORDER AND THE DECLINE IN THE
BIRTH RATE

STUDENTS of population have sometimes assumed too freely that the decline in the birth rate has been due almost exclusively to the passing of the large family. Striking evidence that inroads have been made upon the fertility of small families is afforded by a brief analysis entitled, "Birth Order and the Decline in the Birth Rate," and featured in the editorial section of a recent issue of *Population Index*.¹ The materials presented are designed mainly to illustrate the usefulness of annual census tabulations of births by order of birth. The accompanying chart shows for 1924 and 1934 births of designated order per 1,000 estimated population in the birth registration area of 1924, exclusive of Delaware, Massachusetts, and Rhode Island. The total crude birth rates for 1924 and 1934 are simply broken down to indicate how much of the respective rates is attributable to first births, second births, third births, etc. The shaded areas portray, for each order of birth, the decline in the rate during the decade under consideration.

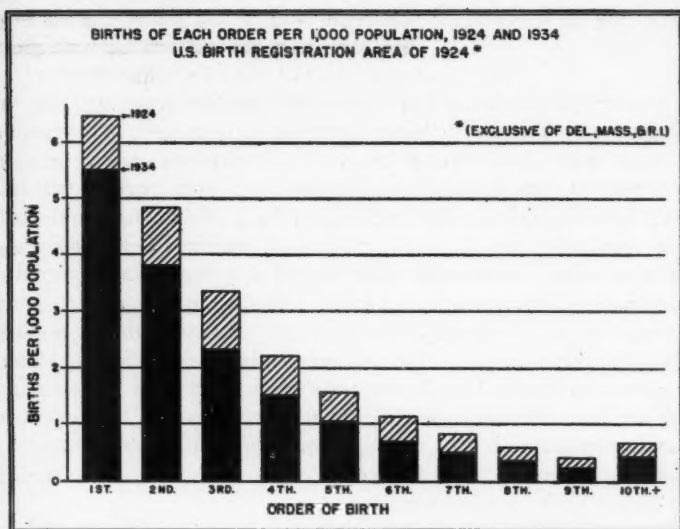
Two outstanding points are visible from the chart. In the first place, the percentage declines in birth rates were greatest among sixth and succeeding orders. The rates of decline were: first births, 14 per cent; second births, 22 per cent; third births, 31 per cent; fourth births, 33 per cent; fifth births, 37 per cent; and births of succeeding orders around 39 per cent.²

In the second place, despite the high percentage decline in birth rates among large families, the absolute declines were too small to exert great influence upon the total birth rate. The large absolute declines among the lower orders were much more important. The situation was summarized as follows:

In 1934 there were over half a million fewer births in this group of

¹ *Population Index*, October, 1937, iii, No. 4. See Frontispiece and pp. 154-155.

² Data of similar nature may also be found in "Decline in Birth Rate in Relation to Age of Mothers," Metropolitan Life Insurance Company, *Statistical Bulletin*, December, 1937, xviii, No. 12, p. 6. In this instance gross reproduction rates, by order of birth, are shown for two periods 1920 to 1924 and 1930 to 1934, in the expanding birth registration area of the United States. In this article emphasis is placed upon the greater percentage declines in the high orders of birth than in the low orders. Little attention is devoted to the strikingly high absolute declines in the lower orders. The article does point out, however, that "the age group of maximum fertility receded from the age group 25 to 29 in the earlier period to the age group 20 to 24 in the later period."



states than the 1924 rate would have yielded. Of this decline, nearly one-sixth was due to the reduction in first births, about one-third to reductions in the first two children, about one-half to reductions in the first three children, and nearly three-fourths to reductions in the first five children. In other words the very sharp drop in the birth rates for the sixth and all higher orders accounted for only a little more than one-fourth of the total decline in births. The reduction in the rates for the first two children alone accounted for more of the decline than that for all orders over five combined.

The decline in the rate for initial births from 6.5 per 1,000 population in 1924 to 5.5 in 1934 is of special interest because it suggests an increase in the proportion of childless women. Questions may arise concerning the validity of using 1924-1934 comparisons of first births as a basis for studying secular trends of infertility. During the early years of the depression the marriage rate fell sharply. According to Stouffer and Spencer, the marriage rate in 1932 was only three-fourths as high as the average annual marriage rate from 1920 to 1929.³ On the other hand, the marriage

³ Stouffer, S. A. and Spencer, L. M.: Marriage and Divorce in Recent Years. *The Annals of the American Academy of Political and Social Science*, November, 1936, p. 56.

rate began rising in 1933 and by 1934 had regained its predepression level. Also, in 1934 the total birth rate was higher than that for the previous year and there is ample evidence that this rare instance of an increase in the birth rate arose in large part from first births, perhaps in considerable degree from first births to marriages postponed by reasons of the depression. Furthermore, computations have shown that in 1930 there were 6.0 first births per 1,000 population in the registration area covered by the analysis. As indicated above, this rate was 6.5 in 1924 and 5.5 in 1934. It is therefore apparent that the previously mentioned 1924-1934 decline in first births did not arise wholly from the shortage of marriages during the depression. Instead, there would appear to be much reality to the suggested increase in childlessness.

For interpretation of the situation the reader is reminded that, since the rates are crude and are based upon the total population, the declines by order of birth could be influenced by changes in such factors as the ratio of married women in the childbearing span, ages of women, and spacing of children. Whatever may be the bearing of these factors, there can be no doubt that an important part of the declining birth rate in recent years has arisen from reductions in the fertility of small families.

CLYDE V. KISER

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